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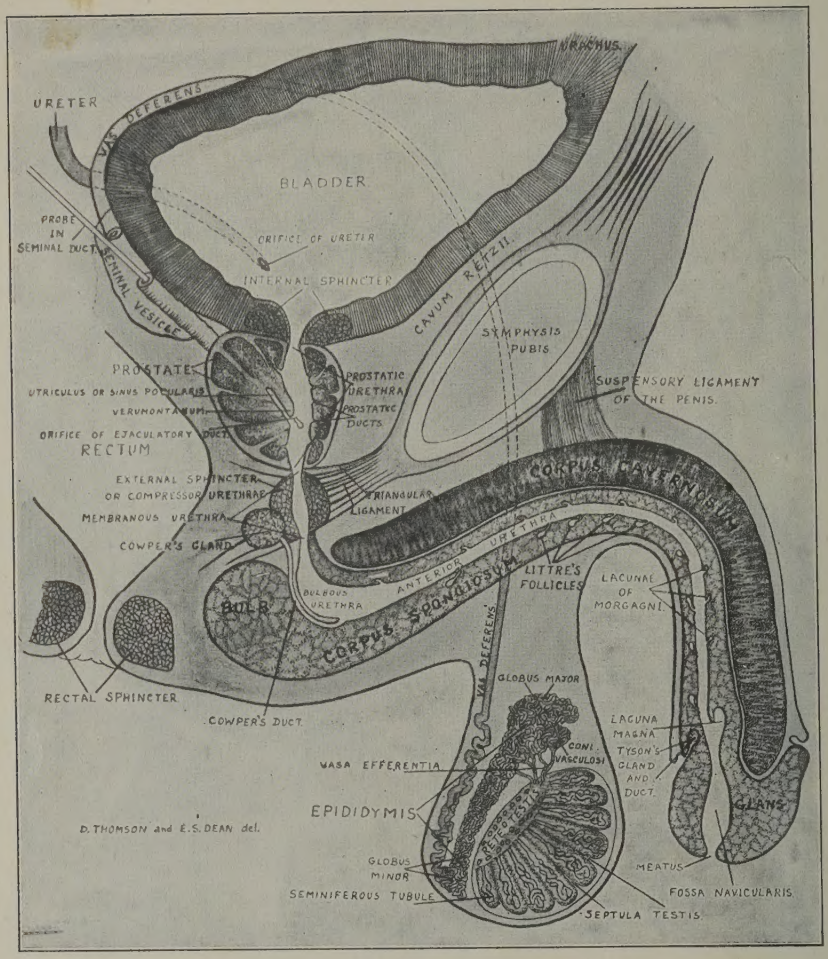
GONORRHEA AND KINDRED AFFECTIONS



SAGITTAL SECTION OF MALE GENITO-URINARY TRACT.
(Courtesy of The Oxford Medical Publications.)

GONORRHEA
AND KINDRED AFFECTIONS

GONORRHEA IN THE MALE, CHANCROID AND VERRUCA ACUMINATA

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AND

GONORRHEA IN THE FEMALE, AND THE INFECTIOUS GRANULOMATA

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PREFACE

The gonococcus—that protean harbinger of marital unhappiness, with its destruction of organs, its force as an agent for the production of sterility and its power of making chronic invalids of men and women at the height of their youth—still maintains a formidable battle front against the onslaughts of medical science and art. Broken here and there by improved methods of diagnostic technic and prophylactic therapy, the main battle is yet to be won before man will be free from this devastating disease.

The writers of this short and practical work have combined their personal experience and present it as a small additional unit in the war on gonorrhea.

The scope of the work is essentially along practical lines, it being the writers' object to clearly present their own conclusions and results in diagnosis and treatment together with such references to the literature as may be necessary to clarify the text.

Great attention has been paid to pathology and diagnosis, and it is the hope of both writers that the book may prove of some aid in the conquest of gonorrhea.

Dr. Livermore wishes to express his thanks and appreciation to his associate, Dr. H. K. Turley, for suggestions and proof reading; to Dr. B. B. O'Bannon, Miss Suter and Mrs. B. Bryan for typing, and to Mr. Scianni for illustrations.

Memphis, Tennessee — George R. Livermore
Philadelphia, Pennsylvania — Edward A. Schumann

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PART I

GONORRHEA IN THE MALE, CHANCROID AND VERRUCA ACUMINATA

CHAPTER I

GENERAL CONSIDERATIONS AND ETIOLOGY

HISTORY

Gonorrhea, according to most authorities, has been known from time immemorial. The word itself is derived from the Greek, meaning "a flow of semen," which was Galen's view of the condition. In his recent history, Block observes very truly that the facts are few, that the disease is referred to in a vague, indefinite fashion, and that exact data are lacking. For example, the history of gonorrhea does not state that it is contagious, and it seems probable that its infectious character was not known until much later. The Ebers manuscript, or papyrus, the earliest Egyptian medical writing, certainly mentions injections which, it is conjectured, were urethral and vaginal—most likely the latter—and "burning discharges" are also mentioned which clearly are those of gonorrhea. These facts lead us to believe that it had made its appearance among Egyptians before Joseph interpreted Pharaoh's dream. The language of Leviticus 15:2, "When any man hath a running issue out of his flesh, *because of his issue* he is unclean," seems clearly to indicate gonorrhea.

According to Proksch, whom Watson quotes, there is a very good account of gonorrhea in a Japanese manuscript of 900 B.C. The ancient historians make frequent references to it, Herodotus relating that the Scythians during one of their raiding expeditions had despoiled the temple of Venus Urana in Ascalon and were attacked by a disease apparently gonorrhea. Roman writers frequently refer to it, and the ancient Jews were well aware of the contagiousness of the disease and prescribed very definite sanitary laws concerning it. The Arabian physicians of the Middle Ages wrote extensively upon the subject and evolved an elaborate therapeusis. In Europe it was explicitly described by Aretæus of Cappadocia, a Greek physician who lived in the latter part of the first and beginning of the second centuries.

The contagious character of gonorrhea was almost universally recognized in the Middle Ages. In 1530, Paracelsus taught that it was a complication of syphilis. The identity of the two was a favorite belief. Fal-

lopius gives us a curious description of true and false gonorrhea, the true being known by a copious, mucopurulent discharge (*multa per penem profluvia*), and regarded by physicians of the time as one of the manifestations of the epidemic of syphilis. Doubts, however, soon arose. Was there an invariable relation of cause and effect between the gonorrheal discharge and syphilis? One thing was common to both; they were always acquired through sexual intercourse (*semel coeundo*). But before Ricord's time some physicians suspected that the two diseases were different. In 1721, Ellis recognized a distinction between them. "By experiment," he writes, "I could not produce a chancre with gonorrheal pus."

This was the true doctrine, but, as the result of an unfortunate experiment, John Hunter taught that there was but a single venereal poison. In 1767, he inoculated gonorrheal pus on the prepuce and glans of some one —perhaps himself—and subsequently found chancres at the site of inoculation. The inevitable conclusion that one disease was but a phase of the other retarded the discovery of the truth for many years. Whether Hunter mistook a urethral chancre for a urethritis or whether the patient had both syphilis and gonorrhea is not known, but the deplorable result was to cause the maltreatment of hordes of sufferers.

Although the existence of gonorrhea, or blenorrhagia as it was usually called, in women was well understood at this time, there was no knowledge of its specificity. When Bernutz and Gonpil reported cases of gonorrheal infection of the appendages and pelvic peritoneum, in 1857, and West, in 1858, ventured the observation that gonorrhea might, in some cases, extend to the intraperitoneal generative organs, these views did not receive support and remained uncorroborated.

About 1850, Hunter was refuted by Ricord, who proved that gonorrhea and syphilis were separate diseases. Ricord's inoculations were performed on a great scale; the report of them fills an entire volume, and though he happened to be right in the main, he made the singular mistake of thinking that gonorrhea was caused by various irritants, such as an injection of ammonia, and that it was not contagious or caused by an organic poison. He states in his letters that women frequently give blenorrhagia without having it. "Blenorrhagia is as rare in women as it is frequent in men. I do not think I go too far in saying that women give twenty claps for one which they have received.

"It is thus, as I have frequently seen, that a married woman may cohabit with her husband without communicating anything to him; but let a lover supervene and the latter contracts a blenorrhagia. The husband

was acclimated; the lover was not" (Ricord, *Letters on Syphilis,* Philadelphia, 1852, p. 48). This observation, perfectly true to-day, is of course due to the fact that the husband, himself a sufferer from latent or chronic gonorrhea, had originally transmitted the disease to his partner, after which he himself was not reinfected.

No mention of gonorrhea as a gynecological disorder is found in Hodge's *Diseases of Women* (1860), and even so careful an observer as Scanzoni does not touch upon it (1863).

The epoch-making work of Emil Noeggerath, in 1872, firmly established the clinical entity of gonorrhea as a definite disease, and through the work of this brilliant gynecologist the attention of the profession was drawn to the damage caused by the infection and to its prominence as a cause of sterility (Emil Noeggerath, *Die latente Gonorrhoe im Weib,* Geschlecht, Bonn, 1872).

In 1876, Noeggerath presented a similar paper at the initial meeting of the American Gynecological Society. The discussion reflected the views of the times, the author being sharply criticized in all quarters and his opinion being received with absolute disbelief.

In 1879, employing Weigert's methods, Neisser discovered the gonococcus. This settled the controversy for all time and left no room for doubt that gonorrhea was a distinct disease. Subsequently, Bokai and Finkelstein confirmed Neisser's results and produced an acute gonorrhea by inoculating two persons. It was also proven that the gonococcus was invariably present.

It is a sad commentary upon the present-day treatment, however (when we consider the rapid advances made in the knowledge of this disease since the discovery of the gonococcus), that we have no specific for its cure, and that there is such a diversity of opinion as to the proper method of treatment and such a multiplicity of remedies. The fact that there is no standard treatment and no drug that is uniformly used, proves conclusively the inefficacy of any one of them. The general practitioner should be told the best remedy. The treatment of gonorrhea is unsatisfactory, but with our present means, Luys says, every acute urethritis should be cured.

Keyes quotes Ricord's famous statement: "A gonorrhea begins and God alone knows when it will end," and adds, "and the aphorism is as true to-day as the day it was uttered." Morton says, "The duration of gonorrhea depends on the longevity of the gonococcus and this organism may live for years after its introduction into the body." Luys, Hogan, Layne, Ziegler, Saxe, Hartman, Wolbarst, and numerous other authors,

cite cases of seven, ten or more years duration. After an experience of twenty-five years, the writer is convinced that gonococci once implanted in the genito-urinary tract remain (except in a limited number of cases) until eradicated by treatment. In many instances, the host of the gonococci and his physician are in complete ignorance of their presence, and the infected individual may continue to spread the disease unknowingly until some condition lowers his resistance and the infection manifests itself. We are all aware of the fact that diseases have been eradicated, without the aid of drugs or treatment, by the patient building up sufficient resistance to overcome them. Hence, there are doubtless many cases of gonorrhea that have been completely cured in this way. However, the old adage (once gonococcus always gonococcus) will hold true in the great majority of cases unless the patient has been subjected to the most careful, painstaking and long-continued treatment.

Prevalence.—Gonorrhea is one of the most prevalent of all diseases. Morrow says 60 per cent of the adult male population of the United States have had gonorrhea. Keyes says one woman is infected to every sixteen men, while in children it is limited to gonorrheal ophthalmia acquired at birth and hospital epidemics due to direct infection. To this I would add the numerous cases of gonorrhea in both small boys and girls, who have been infected by careless or ignorant mothers and fathers themselves afflicted with gonorrhea, by nursery maids, carelessly or purposely in a spirit of revenge for some fancied injury, and by unscrupulous men who believe the dreadful fallacy prevalent among the ignorant classes that gonorrhea can be cured by intercourse with a virgin.

Social Aspects.—Various means have been suggested for checking the widespread distribution of gonorrhea; none, however, without its drawbacks. These are: (1) Prophylaxis, (2) education, (3) regular examination of prostitutes.

Prophylaxis, although helpful, does not always prevent, and furthermore there is the moral objection that by furnishing protection we appear to encourage unbridled indulgence.

Education, at first glance, seems the best of all methods; but despite the educational campaign conducted by the Government during the war and its continuance since, the author has noted no decrease in the number of cases, especially among young men from sixteen to twenty-five years of age.

Regular medical examination of prostitutes, unless thorough, is worthless, and even when thorough is not positive. Here, again, by assuring men

that they will not contract disease, we offend the moral sense by suggesting a means of safety from infection.

The author believes the solution of this problem lies in the home, the church, the Boy Scouts and the Y. M. C. A., in conjunction with the educational campaign of the Government. Teach the boy the proper respect for God, women and himself and inculcate those ideals that make for better manhood. These ideals are to imbue him with the knowledge that health is one of his greatest assets; that indulgence is not essential to health; that the "double standard" is unfair—for his wife is right in requiring of him as much as he demands of her—and last but not least, that the illicit gratification of the sex appetite may render him unfit to marry, and should he do so when he has a venereal disease, he may make his wife an invalid and his children blind, idiots or diseased fragments of humanity who would wish they had never been born.

ETIOLOGY AND BACTERIOLOGY

Gonorrhea is an infectious disease caused by the gonococcus of Neisser (*Neisseria gonorrhœæ*) which attacks the mucous membrane of the genito-urinary tract, rectum, conjunctiva, nose and mouth; it is characterized by inflammatory symptoms and a purulent discharge containing the organism.

Usually transmitted by the direct communication of sound persons with those already infected, it is one of the penalties of promiscuous and impure intercourse of the sexes. The gonorrheal poison thus introduced into the system produces a specific effect, both on the tissue at the place of insertion and on the blood, if the toxin continues to be absorbed; or, in other words, it produces both a local and a constitutional change.

Though a local disease in the beginning, it may become systemic, giving rise to arthritis, iritis, endocarditis and rheumatism. It is the most frequent of the venereal diseases, and its terrible ravages among all classes, together with the misery which it occasions in private life, afford more than sufficient reason for making public its revolting evil. It must prevail to a far greater extent than mere statistics can show. Many persons never confide its symptoms to their doctors, and there is no doubt that a great many women are innocent victims, and are quite ignorant of the real nature of the discharge from which they suffer soon after marriage. French physicians, *e.g.,* Luys, Legueu, and Albarran, give in detail the histories of young married women who complained that before their mar-

riage they were never ill, but that since, they had never known a day of good health.

Volumes have been written, extensive advertising has been done and money has been lavishly spent in combating tuberculosis—and justly and rightly so—but except for the educational effort of the Government, very little has been done to curb or eradicate gonorrhea, which is the cause of more suffering and sorrow than any other ill to which human flesh is heir, because it may lead to disability, deformity and death not only to the patient himself but to others near and dear to him.

Gonorrhea is, therefore, a menace to the individual and a danger to society; it is painful and disgusting in the extreme, and its dangers seem to be incalculable. Yet such is the power of conventional rule that very few are bold enough to "come into the open," as it were, and denounce it publicly.

Morphology of the Gonococcus.—This germ was discovered and described by Neisser as a coffee-bean-shaped diplococcus. It is arranged with the flat surfaces facing each other and is usually found in characteristic groups of four or eight to sixty-four or more pairs. The flat surface is said to be slightly hollowed out, the gonococcus is found in the cell or near it. It occurs in the pus cell, intracellular diplococci, and outside the cells, extracellular diplococci, but never within the nucleus. The intracellular location is the more characteristic and this, because of the protection afforded the germs by the cell tissue, accounts in some measure for the chronicity of the disease. Most laboratory workers hesitate to make a positive diagnosis on finding extracellular diplococci alone. In case of doubt they rely on the culture.

Thomson says that according to Neisser these cocci are more or less spherical in their earliest stages. They soon lengthen and become oval or elliptical in shape; then constricted in the center, assuming a figure-of-eight appearance.

When fully developed they are said to measure from 0.8 to 1.6 micron in length and 0.6 to 0.8 micron in width. M. See (1896) puts the size of the gonococcus at 1 micron long and 0.6 to 0.7 micron wide. Pseudogonococci are much larger than gonococci and are Gram-positive; however, the true gonococcus varies in size within considerable limits and as the characteristic grouping is usually found only in the acute or in chronic exacerbating cases, there is often, in cases of long standing, great difficulty in making a positive diagnosis.

It has been the experience of the author that, regardless of the dura-

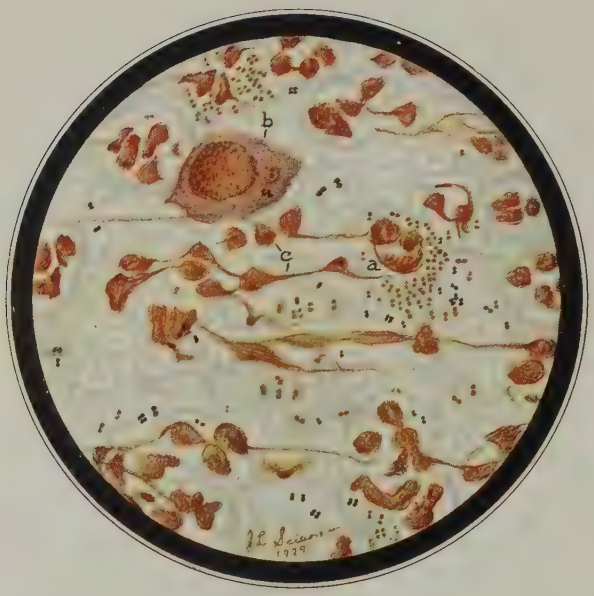

FIG. 1.—GONORRHEAL PUS.

Gram stain, counterstain Bismarck brown. *a*. Nucleus of polymorphonuclear leukocyte and gonococci take brown stain, while pseudogonococci remain black; *b*. epithelial cell with gonococcus and pseudogonococci in tetrad formation; *c*. pus cells and mucous shreds. ($\times$ 1000.)

tion of the disease, if gonococci are present, they can be found in the characteristic shape, size and grouping, if we are diligent and persistent in our search for them. Keyes says the mere presence of Gram-negative intracellular diplococci in pus obtained from a mildly or chronically inflamed urethra does not warrant the diagnosis of gonorrhea, but that culture, if positive, is infallible. The author is in accord with the above but states that when the Gram-negative diplococcus is stained by Gram and has the *typical grouping of the gonococcus,* the diagnosis of gonorrhea is positive. The gonococcus is easily recognized according to most authorities. One great value of vaccines lies in the fact that their administration may sometimes enable us to find the gonococcus in smears from cases which had previously been repeatedly negative.

Variations in Smears at Different Stages.—During the very early stages of gonorrhea, the discharge consists largely of mucus, cellular débris, pus cells, red blood-corpuscles and some bacteria. At this time the gonococci are not necessarily present in great numbers, and are found rather more commonly on the cell than within its wall, as may be determined by locating some bacteria whose edges extend beyond the capsule of the cell.

As the disease progresses and becomes well established, the number of bacteria present increases enormously and the cellular elements being mostly pus cells the organisms are found largely contained within the cell wall, though never in the nucleus. Occasionally many pairs of typical gonococci will be found in one pus cell, whose walls have been pierced by the organism.

While it is not definitely proven, it is thought that the bacteria actually enter the cell structure by a sort of vital activity on their part, and that their pressure is not due to phagocytic action.

Later, in the chronic forms of gonorrhea, the bacteria become much less in numbers, the cells are more or less distorted, epithelial elements predominate and the organisms stain in a variable manner.

Painstaking microscopical examination of smears, then, not only will serve to diagnose gonorrhea, but actually to differentiate between the various stages of the disease.

In cases of chronic gonorrhea in women, there is frequently great difficulty in obtaining smears containing gonococci, since the organisms tend to lie dormant beneath the mucosa and do not appear in the cells. To overcome this, resort may be had to the provocative method, which consists in very slightly dilating and traumatizing the urethra with a sound, and

irritating the cervical canal, either by very slight dilatation or painting the canal with a strong solution of silver nitrate. Twenty-four hours after this procedure smears are again taken from all parts of the lower genital tract, and the organisms may frequently be demonstrated. The same is also true in the males in whom no gonococci can be found, but whose smears may teem with them, following the passage of a sound or the injection of silver nitrate.

Staining Properties of the Gonococcus.—Thomson says the gonococcus can be stained by most of the basic aniline dyes, Löffler's methylene-blue being one of the simplest and best, but except when the grouping is characteristic, it cannot be differentiated by such stains alone. Fortunately, gonococci have one distinguishing characteristic in the fact that they do not take the Gram stain. In other words, they are Gram-negative. By this we mean that when stained with Gram solution and then thoroughly washed with alcohol, the Gram stain is removed from the gonococci and they are left colorless and invisible.

Stain a smear of suspected gonorrheal pus with Gram solution, then examine it under the microscope. If diplococci resembling gonococci are found, wash the same smear thoroughly with alcohol, dry and replace it under the microscope. If the diplococci, resembling gonococci, have disappeared, one can feel reasonably certain that they were gonococci. To make the contrast more apparent, if after decolorizing the gonococci, some aniline stain is applied, the gonococci are colored with that last applied and the pseudogonococci are stained brownish from the Gram. The Gram method of staining the gonococcus must be done correctly and interpreted properly to be of value. The smear of pus must be thin in order that the pus cells may be separated and not crowded one upon another or clumped together. This may be done by putting a drop of pus on a slide and pushing the drop away from the operator with the edge of one slide at an angle to the other, not by placing another slide on top of it and sliding them apart, for often in this way the film of pus is too thick to make a satisfactory examination. In making a smear I prefer to put a very small drop of pus on a slide, then with a toothpick, match or edge of another slide smear the drop so thin that when held to the light only a transparent film is left upon it. This is dried in the air or by gentle heat, then fixed by passing it through the flame of an alcohol lamp or Bunsen burner three or four times.

The original Gram method of staining is as follows: After fixation on the slide, Ehrlich's aniline water gentian-violet solution (consisting of 4 grams of pure anilin, 11 c.c. of saturated alcoholic solution of gentian-

violet, and 100 c.c. of water) is applied for one to three minutes and then washed off with water. Lugol's solution is now applied for one to three minutes. This consists of iodin 1 part, potassium iodid 2 parts, water 300 parts. The slide is then washed with absolute alcohol to decolorize the gonococci and this must not be done too thoroughly. Now counterstain with Bismarck brown (vesuvin) for not more than two minutes. The bacteria which are not decolorized and retain the blue stain are Gram-positive and those which are decolorized or take the counterstain are Gram-negative. The Gram-positive ones are staphylococci, pneumococci, pseudogonococci and diphtheroids, and the Gram-negative ones are gonococci, meningococci, *M. catarrhalis* and the colon group. Pus cells, epithelial cells and mucus are decolorized and therefore are Gram-negative. Jensen modified this technic and made it an easier method with lessened chance of error as follows:

1. Make a thin film.
2. Fix in a flame; avoid overheating.
3. Let cool.
4. Stain with 0.5 per cent aqueous solution of methyl-violet (6.B) for one-fourth to one-half minute.
5. Pour off the methyl-violet and wash away the rest with a drop or two of Lugol's solution. Do not wash with water.
6. Pour on a fresh quantity of Lugol's solution and leave for one-half to one minute.
7. Wash off with absolute alcohol. Use no water.
8. Pour on fresh absolute alcohol, moving the slide from side to side as in developing a photographic film. A third bath may be necessary to complete the decolorization.
9. Finally, rinse it with a few drops of absolute alcohol, followed immediately (without washing) by a solution of neutral red (neutral red, 1 to 2 grams; 1 per cent glacial acetic acid, 2 c.c.; distilled water, 1000 c.c.). Stain one-quarter to one minute.
10. Dry in air and examine under the microscope.

Thomson says that it is undoubtedly the safest and most reliable method of using the Gram stain.

Gram's method may also be applied as follows: To 10 c.c. of distilled water add 2 c.c. of aniline oil. Shake, and filter through moist filter-paper to remove oil globules. To the clear filtrate add 1 c.c. of 98 per cent alcohol and a like amount of a concentrated alcoholic gentian-violet solu-

tion. After fixing the suspected secretion by passing it through the flame in the usual manner, it is covered with this solution for from two to three minutes. Drain off the excess of stain with filter-paper, but do not wash in alcohol. The cover-glass is now placed in Gram's solution for five minutes, and thence transferred to absolute alcohol to decolorize. This should be continued until the drainings fail to stain the filter-paper. After the alcohol, the preparation is washed in water and placed in a solution of Bismarck brown, 1 part, and water, 5 parts. In this it is allowed to remain for one or two minutes, or for forty-five seconds in a saturated aqueous solution of Bismarck brown diluted with three times its volume of water. It is then washed in water and mounted in the usual way. The gonococci, having been decolorized by the Gram stain, are now brown.

There are other methods of differentiating the gonococcus by staining, chief among which are Wahl's and Leszcynski's. Wahl's method, 1903: Stain for five to fifteen seconds with a solution containing concentrated alcoholic solution of auramin 2 parts, concentrated alcoholic solution of thionin-blue 2 parts, concentrated alcoholic solution of methyl-green 3 parts, 95 per cent alcohol 1½ parts, distilled water 6 parts. This preparation keeps for one year and can be used immediately after it is made. The ground work of the slide is bright blue and the gonococci are reddish-violet to black. Leszcynski's method, 1914: Dilute pus with water and make a thin smear. Dry and fix, then stain for one minute with a solution containing saturated aqueous thionin-blue 10 parts, distilled water 88 parts, liquid carbolic acid 2 parts. Wash with water, then counterstain for one minute with saturated aqueous picric acid 50 parts, potassium hydroxid, 1:1000, 50 parts. Without washing with water, apply absolute alcohol for five seconds, rinse with water, dry and mount in Canada balsam. The protoplasm of the pus cell stains a yellowish-straw color. The nuclei are reddish-violet. The epithelial cells are somewhat brighter and the gonococci are well-defined black bodies, while other bacteria are yellowish or rose red.

My laboratory technician recommends the following solution as a simple stain for gonococci: Safranin 0.3 c.c., methyl alcohol 5 c.c., water 180 c.c. She prefers it to all others, except when necessary to differentiate the gonococcus from other diplococci, and gives as the reasons for this preference that: "It stains uniformly and evenly, giving a clear field with objects brought out in definite outline. In smears that are made a little thicker than they should be, it brings out better detail. Especially is this true in smears where there are many epithelial cells and much

mucus, for often gonococci can be found in the epithelial cells or mucus that would be totally obliterated by other stains. The film washes clear and that 'cloudy' appearance obtained with methylene-blue is avoided."

Gram's Method for Sections.—This is applied as follows:

(*a*) Stain with aniline water gentian-violet or aniline water-methylene-blue for from ten to twenty-five minutes.

(*b*) Wash in aniline water thirty seconds.

(*c*) Transfer to Gram's solution for one to two minutes. (Sections now become brown.)

(*d*) Wash in absolute alcohol until sections appear nearly or entirely sustained. The purple color of the gentian-violet changes to dirty yellowish-brown, and the sections resemble tea leaves. The sections must become brown. In the alcohol the purple color of the gentian-violet returns and is dissolved out, so that if the manipulations have been properly performed, the films at this stage are practically colorless. The decolorization may be hastened by moving the sections gently about in the alcohol. Two or three baths are usually required—a fresh one as soon as the first becomes discolored. If drop glasses are used for decolorizing, it is important to remember the side of the slide on which the section is, for this is somewhat difficult to determine after decolorization has taken place. At this stage the sections may be cleared in cedar oil and mounted. Gram-positive organisms are blue-black, and Gram-negative bacteria are unstained, or the sections may be counterstained to bring out the tissue and micrococci that are not stained by Gram's solution.

(*e*) For counterstaining, wash in water and immerse in a solution of dilute fuchsin for five to ten minutes. If desired, a solution of eosin may be substituted for the fuchsin for fifteen or thirty seconds.

(*f*) Wash in 60 per cent alcohol.

(*g*) Dehydrate in absolute alcohol.

(*h*) Clear in cedar oil or xylol and mount.

Result.—All the Gram-positive bacteria are stained blue-black; the tissue, red; the cell nuclei, pale blue or even dark blue. Bacteria are frequently not stained equally well in all parts of the section, and this is particularly likely to be so if the section is a large one or thicker than 5 μ.

Demonstration of Gonococci in Urine.—Occasionally it is impossible to perform a vaginal examination, for one reason or another, and the diagnosis of gonorrhea is attempted by the discovery of gonococci in the urine. For this purpose a large morning specimen is required, the urethra being milked from within outward by the patient, just before voiding.

The urine is centrifuged at high speed for three minutes and the sediment is then spread on large slides and stained as above.

The method is most unsatisfactory and rarely leads to a decision as to the nature of the case. Negative findings are, of course, meaningless.

Demonstration of Gonococci in Dried Secretion.—It sometimes becomes necessary to isolate the gonococci from stains upon linens, etc., especially from a medicolegal standpoint in cases of rape.

Obviously, this is a difficult and uncertain procedure, although various technics have been elaborated to accomplish the desired result. The best is probably that of Heger-Gilbert (quoted by Norris), who employed the following method with better success:

A small linen pad or piece of blotting paper, moistened with isotonic salt solution (0.9 sodium chlorid in 100 parts of water) and rendered alkaline by the addition of sodium bicarbonate, is placed in a watch glass. The suspected piece of linen is cut out and laid on the pad and covered. After from one to five hours, according to the age, thickness and dryness of the specimen, the droplets that collect underneath are obtained with a suction pipet and placed upon a slide, dried, and stained. By this method, Heger-Gilbert was able to demonstrate gonococci in secretion that had been dried for two years.

Differential Bacteriological Diagnosis.—Certain organisms so closely simulate the gonococcus that separation is sometimes difficult, especially when gonococci are few in the smear and other organisms numerous. If Gram's stain is employed, only the Gram-negative cocci need be considered, and of these, the *Micrococcus catarrhalis* and the *Micrococcus meningitidis* closely resemble the gonococcus in morphology, the former being somewhat but not noticeably larger. Many other Gram-positive bacteria may be mentioned as simulating the organism of Neisser, but few of them inhabit the genital tract, or cause symptoms at all parallel to gonorrhea. Nevertheless, for medicolegal purposes, cultures of the organism form the only positive means of identification.

Resistance of the Gonococcus.—Individual strains of the organism exhibit marked variation in resistance, but in general it may be said that the gonococcus resists cold well, but is always destroyed by a temperature of 0° C.

They are killed by a temperature of 45° C. and cease to grow below 30° C. Complete desiccation kills them in a few hours, and they are extremely susceptible to germicides, even if very weak solutions are used. This is especially true of antiseptics containing silver salts.

In pus or secretions upon linen the organisms have been known to live for forty-nine days, an important point in a consideration of the spread of the disease.

About 1895, Werden advanced the theory that the staphylococcus was jointly a causative factor with the gonococcus in the production of gonorrhea. Crabtree, however, assailed Werden's theory and after careful analysis and study concluded that such observations are fallacious, and this conclusion is the consensus of opinion among the urologists of to-day. That we often have another infection engrafted upon a gonorrhea is too well known to be disputed, but that the staphylococcus is the joint cause of gonorrhea is undoubtedly erroneous and not borne out by the evidence presented.

Culture of the Gonococcus.—In our laboratory we have had quite satisfactory results with the medium of Hirschfelder, but have experienced the same difficulty of overgrowth of staphylococci as noted by Hogan. Hirschfelder says this can be obviated by adding anilin type I which prohibits the growth of the staphylococcus, and Hogan says gentian-violet in the proportion of from 1:200,000 to 1:500,000 appears to be of the greatest value.

Hirschfelder's medium is prepared as follows: 200 grams of bullock's testicles ground with a sausage grinder are boiled with 100 c.c. of water, made alkaline with sodium hydroxid, so that 10 c.c. require 1 c.c. of decinormal acid to neutralize it, with phenolphthalein as indicator. After filtering, one part of this testicular extract is added to three parts of agar, prepared as follows:

Veal bouillon	1000 c.c.
Saturated solution of sodium phosphate made neutral to phenolphthalein with phosphoric acid	100 c.c.
Agar	30 grams

In the laboratory of the Methodist Hospital, where Dutton has found the culture-medium of Pelouze and Viteri to be very satisfactory for the cultivation of the gonococcus, it is prepared as follows:

A calf's brain weighing approximately 500 grams is forced through a wide meshed gauze into 500 c.c. of distilled water and placed in the ice box for twenty-four hours. It is then filtered several times through cotton of varying degrees of compactness. The resultant fluid is turbid, no matter how often it may be filtered. To this is added 0.5 per cent of acid sodium

phosphate and 1 per cent of peptone. It can now be autoclaved at 15 pounds pressure for twenty minutes and kept as stock, or the final steps for its completion can be immediately carried out. To complete the medium it is simply necessary to add one part of the brain bouillon to three parts of standard 2.5 per cent agar medium made from veal broth, with the addition of 0.5 per cent of sodium chlorid and 1 per cent of peptone. It should then be adjusted to a P^H of 7.8, which allows for a reduction of two points in autoclaving, 7.6 being the desired end point. The medium is then tubed, autoclaved and slanted. After it solidifies, the usual cotton plug is replaced by a sterile rubber cork to retain the water of condensation; the medium keeps indefinitely.

Pelouze and Viteri state that if a few conditions are complied with the gonococcus is as easily grown as most of the other organisms and the success or failure rests with the medium and not with the other technic. They say reduced oxygen tension is unnecessary as the culture grows equally well and probably better at normal oxygen tension. The medium they have devised can be autoclaved after completion; it gives as many positive first cultures; it grows the germ indefinitely in subcultures and retains its viability for at least a month.

The Culture of the Gonococcus (Thomson).[1]—Bumm, in 1885, grew the gonococcus in pure culture on solidified human blood-serum which he obtained from the placenta immediately after delivery and by inoculation experiments in the human urethra was able to reproduce gonorrhea, thus conforming to Koch's postulate. Wertheim (1891) introduced serum agar and thus gave a practical method for the culture of the gonococcus. His technic consisted in mixing thoroughly several platinum loopfuls of gonorrheal pus with sterile human blood-serum in tubes, some of which were diluted. The tubes were then placed in a water-bath at 39° to 40° C. (102° to 104° F.). The contents of the tubes were added to equal amounts of fluid agar (agar 2 per cent, peptone 1 per cent, sodium chlorid 5 per cent) at a temperature of 40° C. (102° F.). After mixing thoroughly these were poured into Petri dishes and placed in an incubator at 36° to 37° C. (97° to 99° F.). In the undiluted serum agar a diffuse cloudiness appeared, while in the diluted agar visible colonies made their appearance the following day. These were large enough to be used to inoculate coagulated human serum and in forty-eight hours he grew a pure culture of gonococci. With these cultures he was able to successfully infect the urethræ of several paralytics. After several experiments he found that one

[1] With permission of Thomson, *Gonorrhœa*, Oxford University Press.

part of fluid human blood-serum mixed with two or three parts of meat-extract "peptone" agar was the best proportion.

Other human and animal exudates and sera have been used. Steinschneider (1890) successfully employed hydrocele fluid as a culture-medium. Young (1900) also reported successes with it. Menge (1893) used fluid from ovarian cysts and hydrosalpinx and McCann (1896) also had success with ovarian cyst fluid. Kiefer (1895) had similar success with ascitic and pleuritic fluid. Scholtz (1899), however, pointed out the variableness of the albuminous contents of such fluids and advised testing them before relying on them as culture-media.

Thausais says ascitic fluid has been found to be as good as Wertheim's blood-serum agar. It is prepared as follows:

One liter of ascitic fluid is well shaken with 20 c.c. of chloroform to sterilize it and kept ready for use in sterile flasks. When culture-medium is required, take three parts of nutrient agar and mix with one part of ascitic fluid. Heat the mixture to 60° C. (140° F.) for one hour and then pour into Petri dishes or tubes. No further sterilization is necessary. It should be prepared fresh, as the gonococcus grows better on moist, fresh medium than on old, dry ascitic agar; but Koch says that certain strains seem to grow better when it is somewhat old and dryer. In order to isolate the gonococcus from gonorrheal discharges, the surest method is to cleanse the glans, penis and meatus with sterile saline, squeeze out the pus and by means of a platinum loop carefully distribute it over the whole surface of the culture-medium in a Petri dish. Place in the incubator and examine after twenty-four hours. When the gonococcus has been isolated in pure culture, it is advisable to subculture it in slope tubes rather than on plate culture, since the former do not dry up so quickly and they are not so liable to be contaminated.

Watson states that the reaction of the medium is of primary importance. A reaction nearly identical to that of blood-serum is the ideal and the medium should be only slightly acid to phenolphthalein (0.6 per cent). He has found Blair Martin's formula a very reliable medium. Martin's agar is prepared as follows:

"A beef extract is prepared as usual. To it are added 0.5 per cent of disodium phosphate, 1 per cent of Witte's peptone and 2 per cent of powdered agar. The mixture is placed in Koch's sterilizer and after the agar has melted the medium is titrated while still hot. For this purpose, we take a 5 c.c. sample of the medium, add 2 drops of a 0.5 per cent phenolphthalein solution and then run in a $\frac{1}{20}$ normal sodium hydrate

solution from a buret until a faint but permanent pink color, which distinctly deepens on cooling, appears. This is taken as the end point and if the medium is of the correct degree of acidity (0.6 per cent acid to phenolphthalein or 6. on Eyre's Scale) 0.6 c.c. of soda solution will have been used (with above proportions).

"In practice more alkali is at first required: This is corrected by adding to the medium in bulk normal sodium hydrate solution in proportion of 1.4 c.c. to each 100 c.c. of medium (usually rather more than the calculated figure is actually requisite). The reaction having been adjusted, the medium is filtered, tubed and sterilized as usual. Care should be taken to avoid prolonged cooking, as this causes a darkening of the medium, which by masking the tints increases the difficulty of titration. Also, if white of egg is used for clearing purposes, allowance must be made for the fact that it is usually more acid than the medium. When properly prepared the agar is practically colorless and it should also possess only a moderate amount of water condensation. Too moist, or too dry a medium is a fault."

On the surface of each agar tube Martin runs three or four drops of sterile human serum which has been kept at 57° C. (134.6° F.) for one and one half hours. When the process has been completed the tubes are incubated for twenty-four hours to insure that they are sterile. This also allows the serum to dry on the surface of the agar. Martin adds 0.2 c.c. of serum to the melted agar after it has cooled to 45° C. (113° F.). Before being inoculated it is further cooled in the thermostat to 40° C. (104° F.), as the gonococcus is very susceptible to heat, surviving only ten minutes in a temperature of 44° C. (111° F.) and being almost immediately destroyed at 45° C. (113° F.) (Marcus).

The highest temperature for gonococcus cultivation is 36° to 37° C. (96.8° to 98.6° F.). Above 41° C. (105.8° F.) and below 32° C. (89.6° F.) no growth will take place.

Immunity.—There is no apparent immunity against the gonococcus, in man, unless it be of so transient a character as to be of no clinical significance. The disease is peculiar to man, all of the lower animals being immune to inoculation, even the anthropoid apes.

Toxin.—The gonococcus develops a gonotoxin which is present in the cells after heating and contact with alcohol.

Whether or not the toxin, or endotoxin, as it may prove to be, has the power to produce metastatic gonorrhea has not been proven. Arthritis has been ascribed to the activity of the toxin, but without definite proof.

CHAPTER II

DIAGNOSIS, PATHOLOGY AND PROPHYLAXIS

COMPLEMENT FIXATION TEST

The complement fixation test has undergone important changes even in so short a time as the last four years. "The Bordet-Gengou reaction," writes Brahns, "as practised today, differs essentially from the method of 1923." The work of Tullock, Jottner, Finkelstein, Cohen and Grafenberg, has removed some errors and cleared up many obscure points. A Russian writer, Sophie Iasolko of Moscow (*Uroghtia,* 1926, 1:120) has written the most lucid account of the reaction, and her method of performing the Bordet-Gengou test may be briefly summarized as follows:

An antigen prepared with water is not stable; it should be prepared with antiformin, and the cultures of the gonococcus used are best obtained on the ascites-agar medium of Finkelstein. It is essential that the pus should come from fresh discharges. A twenty-four-hour culture is made into an emulsion with 5 c.c. of distilled water; 2 c.c. of 4 per cent saniformin is added and the emulsion neutralized by adding sulphuric acid drop by drop. The traces of chlorin are removed by placing the mixture in the water-bath at 54° to 56° C. (129.7° to 132.8° F.).

The results were unusually good. The serum of 502 patients was taken, and an hemolysis was observed in 81 per cent.

Another method, described last year by Alfred Cohn in his *Serodiagnosis of Gonorrhea,* is somewhat similar. In making the antigen several strains of the A and B type of gonococci were used, which had grown for forty-eight hours on Levinthal's influenza agar. The technic is comparatively simple and the results excellent. The emulsion is titrated against a positive and negative human serum by Blumenthal's method. The titer of all emulsions was between 0.03 and 0.05. The blood is taken from the patient's arm as in the Wassermann, and it must always be fresh when tested.

Müller and Oppenheim, in 1926, reported the use of a polyvalent antigen, made of fresh cultures on ascitic agar. Their results are given in detail, thus:

Disease	Cases	Per Cent Positive
Acute gonorrhea	114	28.95
Acute posterior gonorrhea	92	48.91
Chronic gonorrhea	105	31.43
Epididymitis	64	56.25

In new papers on this test the methods employed are much simpler than those of older observers. The mastery of the old technic was the work of many years' training, and the man who attempted to master it was obliged to start at the beginning in some laboratory. The main difficulty, now, of preparing the antigen, is resolved by attention to a few details. Sophie Iasolko, whose work was done under Fronstein's direction, states that the antigen made by Finkelstein's method must answer to the following requirements:

1. It must give a fixation of complement with the serum of a patient with gonorrhea (*i.e.*, by careful adjustment and titration of the hemolytic indicators).
2. It must be tested against normal serum.
3. It should not itself hemolyze sheep cells in the absence of an hemolytic serum and of complement.

Neglect of these rules has been the cause of many errors in the past. At first sight, the observance of such rules may seem tedious and difficult, but, nowadays, several of the needed reagents may be bought, and the test is not outside the province of the well-trained practitioner.

But although these different methods are strict, even to pedantry, the complement fixation is not now such a model of scientific accuracy that experienced clinicians pay it much attention. It has a bare mention in the best and most recent publications. Wolbarst devotes a page to it; Buschke and Langer observe that it is almost forgotten in Germany, and Luys in his *Traité de blennorrhagie,* 1927, appears to have very little interest in it; it is wholly passed over in Lees' *Practical Methods in Venereal Diseases* (1927) and in Orlowski's *Behandlung der Gonorrhoe* (1927).

The materials and technic necessary for its performance are here given as perfected by the research laboratory of the New York City Health Department.

Materials and Technic.—Patient's serum, gonococcus antigen, guinea-pig complement, indicator (sensitized cells), 0.9 per cent saline solution. The patient's serum and all reagents are pipetted in one-tenth the original Wassermann volumes. The serum is removed from the clot twenty-four

hours after bleeding and is kept in the ice box at 8° C. (46.4° F.) until it is tested. The serum is inactivated by heating in the water at 56° C. (132.8° F.) for thirty minutes. The patient's serum is mixed in a test-tube with the standard dose of gonococcus antigen and the standard dose of guinea-pig complement. This mixture is placed in the water-bath for one hour at 37° C. (98.6° F.) to allow the reaction to take place. The complement fixation reaction is invisible and must be demonstrated by an indicator. For this purpose sensitized cells are used. The sensitized cells consist of 0.1 c.c. of a 5 per cent suspension of sheep cells mixed with the standard dose of antisheep amboceptor. They are added to all the tubes at the end of the fixation period. If any free complement is in the test-tube after the fixation period, it will combine with the sensitized cells, producing hemolysis of the sheep cells. If there is no free complement in the test-tube after the fixation period, that is, after all the complement has been fixed by the combination of the patient's serum and gonococcus antigen, there will be no hemolysis in the test-tube. If the patient's serum contains gonococcus antibody, there will be complete or partial fixation of the complement. If the patient's serum contains no gonococcus antibody there will be no fixation of the complement.

In order to be sure that the reactions in the test-tube are due to the combination of antibody with antigen, the following controls must be made with every set of diagnostic tests. The patient's serum must be tested for anticomplementary reaction to guard against false positive diagnosis and it must be tested for natural antisheep amboceptor to avoid false negative results. The antigen must be tested for anticomplementary reaction to avoid false positive diagnosis. The complement must be tested for hemolytic activity to avoid false negative results. Although the complement dose has been carefully standardized before the tests are made, a control must be put in with the tests in order to be sure that the complement has not deteriorated during the period of the test. The sensitized cells must be tested for stability to avoid false negative results. The accuracy of the test depends upon the most careful adjustment of all the reagents, also the cleanliness, neutrality and accurate calibration of the glassware and upon the skill of the technician.

The comparison between the relative merits of bacteriological and complement fixation tests was first reported by Keyes. In his series, "Complement Fixation Test was found to be wrong in 1 out of 47; bacteriological test 1 in over 100 examinations." McNeil says, "In cases of anterior gonorrheal urethritis in the male and acute vulvovaginitis in the female, a

positive reaction is practically never obtained. But shortly after the posterior urethra in males and the cervix and glands of Bartholin in females are involved, the same patient reacts positively."

Barringer says, "The complement fixation test is, therefore, sooner or later positive in cases (in the male) of posterior urethritis, prostatitis, seminal vesiculitis, epididymitis, cystitis, pyelonephritis, arthritis, etc."

Keyes says he has obtained a reaction in twelve days, although it usually is not present for at least four weeks.

McNeil says it persists from four to six weeks after a cure has been obtained. A negative reaction has been obtained two weeks after a cure.

Schwartz says, "If vaccines are given to a patient who has a fading or weakly positive complement fixation test, the vaccines will change this weakly positive to a strongly positive test. If a patient has not recently had gonorrhea, the giving of vaccines will not affect his complement at all."

Rockwood, however, states that in 2 per cent of his cases vaccines (three hundred million gonococci) were injected in six weeks and both gave a negative reaction.

Vaccines given to animals cause a complement fixation test to persist for about fifty days. It is probable that this is a good index for its time of persistence in man.

Barringer says a complement fixation test either weak or strong is caused by gonococcal inflammation.

Practical Value.—"In all cases of anterior gonorrhea, a clear urine or a bacteriological test is necessary to declare a patient cured. In all cases of posterior urethritis I have with very few exceptions used the complement fixation test alone. Its results, of course, must be interpreted with discretion. If a patient has a general arthritis, and a complement fixation test pronounces this gonorrheal in origin, gonococci are not necessarily present in the urethra. In case of a differential diagnosis between rheumatoid arthritis and gonorrheal arthritis, the complement fixation test fixes the diagnosis. Naturally, the complement fixation is negative if an arthritis is due to a non-gonorrheal seminal vesiculitis" (Barringer).

Personally, the author has never relied on the complement fixation test alone, as he considers it too susceptible of error unless checked up repeatedly and made in a laboratory where it is being done numbers of times every day and where its accuracy cannot be questioned. We should also bear in mind that the complement fixation test may be positive long after the gonococcus has been eradicated. He does not agree with Barringer that a clear urine *or* a negative bacteriological test is indicative of a cure.

He prefers to say a clear urine *and repeated* negative bacteriological tests are the necessary criteria, then a rest and more negative tests, for he has seen many cases with a clear urine and negative bacteriological tests in which there has been a recurrence in a few days or weeks after suspending treatment. This is not only true of anterior gonorrhea, but even more so of posterior gonorrhea. The author feels sure no urologist would be willing to swear that a patient who has had chronic posterior gonorrhea was cured and absolutely gonococci free. He would state that if the tests were negative, to the best of his knowledge and belief he was cured, but he certainly would not be so foolish as to swear to it, for regardless of our thoroughness or regardless of the complement fixation test, cases that are apparently cured recur and the discharge contains typical gonococci with all the grouping, staining and cultural characteristics. Therefore, if the complement fixation test is used, do not neglect the bacteriological tests, for it is the 20 per cent failures that must be proved cured by the bacteriological tests.

Müller and Oppenheim (1906) were the first to make use of this test. Much valuable experimentation has been done and data furnished by Brück, Teague and Torrey, Vannod, Wollstein, Waltabiki and others.

Its use and value have been reported upon favorably by Schwartz and McNeil, Schmidt, Keyes, O'Neil, Lederer and Hecht, Brahns, Jones and Simons, Ribes and Lawrence, Shupe. Shupe reported a series of a thousand complement fixation tests and in every case in which the result was positive there was always a history of gonococcic infection. The test is generally negative in the first five weeks in acute cases. If limited to the anterior urethra and cured in six or seven weeks, it may never show a positive reaction. A positive reaction in a person clinically cured indicates the presence of a gonorrheal focus. In gonorrheal arthritis, about 100 per cent of positives are obtainable. Cases of chronic prostatitis, seminal vesiculitis and posterior gonorrhea gave 80 per cent positive reactions. An uncomplicated stricture does not give a positive test.

Keyes says, "The diagnostic value, like that of gonococcus culture, varies in accordance with the skill and experience of the operator, but except for infection confined to the anterior urethra, technical errors are much less likely to interfere with the validity of the complement fixation test than with gonococcus culture. Positive culture on the other hand is more certain evidence that an infectious lesion persists in the urethra than is a positive complement fixation test. Nevertheless, the practitioner will be wise to rely less upon the complement fixation test than upon anything else for the diagnosis of the presence of gonorrhea."

George Gilbert Smith says, "It stands to reason that as complicated a test as this can be of value only when done by an experienced pathologist. Even then it should be regarded simply as one of the data which aid in the formation of an opinion as to diagnosis or question of cure."

Other investigators include Swinburne, Gradwohl, Gardner and Clowes, Thomas and Ivy, Kolmer and Brown, Smith and Wilson, Dixon, Lailey and Cruickshank.

PATHOLOGY

When the gonococcus is implanted on the mucosa of the urethra, it immediately begins to multiply and, by the elaboration of irritating toxins, produces an inflammation characterized by the outpouring of serum and by the exfoliation of the lining epithelium. There is first a curling upward of the edges of the epithelial cells, resembling the buckling up of shingles on a roof from exposure to sun and rain. The gonococci are thus enabled to penetrate between the cells and by the irritating effects of their toxins, cause marked congestion and exudation of serum, followed later by the exfoliation of the outer layers of the cells. This process is repeated until they have penetrated to the subepithelial tissues. The capillaries are filled with leukocytes rushing to stem the advance of the infection, and dead and degenerated cocci set free the toxin in sufficient amount to damage and irritate the mucous membrane and severe hyperemia occurs, with exudation of serum. This occurs as the initial manifestation of the disease, the so-called prodromal stage.

The epithelial cells become swollen and separated from one another by the serous exudate passing from below to the surface, and the gonococci commence to grow down between them toward the subepithelial connective tissue, which they eventually reach. The epithelial cells, becoming loosened, are cast off in large numbers, constituting a large proportion of the discharge at this stage of the disease. The shedding of epithelium may be so extensive in places that the subepithelial connective tissue is laid bare, leaving eroded patches. The serous exudate is rapidly followed by one containing cells from the vessels in the subepithelial connective tissue, the exuded cells consisting for the most part of polynuclear leukocytes, with a small number of lymphocytes, which pass through the epithelium and appear in the thick creamy discharge characteristic of pus in the acute stage. This usually develops within six to twenty-four hours after the prodromal stage.

How Is Gonorrhea Contracted?—Gonorrhea is usually contracted during intercourse by the transference of gonococci from the genitalia of one person to those of another. Gonorrhea of the rectum and mouth have been known to result from unnatural practices between men and women, or between two men. However, infection from wet gonorrheal pus on towels, instruments, fingers, toilet seats, bathtubs, bed linen, sponges, etc., may and does occur, provided the wet pus is deposited upon the mucosa of the meatus, urethra, vagina, cervix, rectum, eyes, mouth or nose. If, however, the pus has dried there is very scant likelihood of its transmitting the disease. Even if it has dried for only a very short time, the germs, according to Scholtz (1903) are always found to be dead. Haberda (1894) says that gonococci lose their vitality on dry linen in one hour. Finger, Ghon and Schlagenhaufer (1894) say the germs will remain alive in gonorrheal pus only as long as it is moist. In one case, however, gonococci were found in pus that had dried for twenty-two hours. Steinschneider and Schaffer (1895) say gonococci, when exposed to drying, live only five hours. Thomson says most authorities agree on this point.

That the gonococcus may live in a moist state for a few hours has been alleged by numerous authorities. For example, when the pus is moist, they may retain their vitality for hours, even as long as twenty-four. Steinschneider and Schaffer say that gonococci in pus will retain their vitality in warm water, or urine for one or two hours, and Stein says they can be cultivated from non-albuminous urine after seven hours, but not later than nine hours. If the urine is albuminous they can be cultivated after twelve hours.

With the above evidence before us, we should be especially careful to warn our patients about the infectiousness of gonorrheal pus and to instruct them how to protect themselves, as well as those with whom they come in contact. Despite smutty stories to the contrary, the innocent contraction of gonorrhea is almost of daily occurrence, as the host of babies and children and a few innocent adults so forcibly prove, and the loss of eyes from gonorrheal ophthalmia (not only among the laity, but among the profession) is so appalling that no thinking person can fail to be impressed with the infectiousness of gonorrheal pus, regardless of the method or instrument of its transmission. We should, therefore, be very guarded in our condemnation of those afflicted with gonorrhea and hesitate to allow husband, wife, or paramour to accuse his or her mate of infidelity when the innocent contraction of gonorrhea is now positively proven to be a fact.

The multiplicity of drugs for the treatment of gonorrhea and the many methods for the application of the same, and the numerous advertising quacks are prima facie evidence of the inadequacy of any of them. It has been the experience of the author that the successful treatment of a case of gonorrhea is dependent upon the gentle, painstaking and long-continued efforts of the physician, the frequent changing of the medicament used, and the faithful coöperation of the patient. No one drug is suitable for every patient, for often one that is soothing to the mucosa of one man is violently irritating to that of another, and after one drug has been used for some time, the gonococci seem to gain a tolerance for it, which is lost when another is substituted. A drug, too, that is soothing if used once a day may prove irritating if used too often. This is notably true of acriflavin, which should only be used once a day.

It is remarkable, and I have seen repeated cases in which a husband and wife, both infected with gonococci, have sexual intercourse regularly for years without any exacerbation of the disease. Wertheim has noted this and says one becomes immune to the other's infection. Nevertheless, each of these infected persons, though showing no signs of the disease, may be capable of infecting another, and may also be capable of denying their guilt, when accused; and the physician, if he is consulted and declines to give a favorable opinion, may be blamed for getting money by treating a non-existent disease.

It is a fact that of two men who cohabit with an infected woman, one may contract gonorrhea and the other escape. This is often due to the anatomy of the penis, the carelessness in cleansing after intercourse, and to the fact that one may have been intoxicated. A certificate that a woman is free from venereal disease means nothing. Certificates are often given by men incompetent to make a thorough examination, or by those so unscrupulous as to give a certificate without even making any kind of examination. Then, too, regardless of the strictness of the examination, the failure to find gonococci on one examination means nothing, for only by repeated, painstaking and careful tests, extending over a period of several weeks can any one be certain that a man or woman is free of gonococci, and even then I would qualify my statement by saying that to the best of my knowledge and belief the patient was gonococci free. It is also true that a woman may be more infectious just after her menstruation, the congestion having brought forth the hidden gonococci, and hence, one man who had intercourse with her prior to her menstruation might escape, while another who did so following it, might contract the disease.

Immunity.—An attack of gonorrhea does not confer protective immunity against reinfection. Subsequent infections are often milder than the first, but they may be as protracted or even more severe. It is a fact, too, that in the old chronic cases there is conferred a certain amount of immunity, which protects as long as the subject limits his sexual relations to the same mate, but almost invariably he again develops symptoms when he has sexual intercourse with another woman. The author has seen many chronic, supposedly cured cases in husbands who had an exacerbation from drink, exercise or sexual excess, with a return of the discharge in which gonococci were found, but failed to infect their wives, and who yet infected other women with whom they had intercourse. The author believes this is due to the probability that the wife derives a certain amount of immunity through intercourse with her chronically infected husband, which enables her to protect herself against the attenuated gonococci of her husband. On the other hand, it frequently happens that the wives of men who have old symptomless gonorrheas, often infect a lover while they themselves present no symptoms of the disease; this being due to the fact that even though the infection is attenuated it gains a foothold on uninfected soil.

Wertheim obtained a pure culture of gonococci from an old (latent) case, which produced an acute and virulent urethritis. Buschki, on the other hand, describes the case of a man who remained immune, although his wife had a virulent gonorrhea of the cervix.

Prophylaxis.—If prophylactic measures are instituted immediately after intercourse, it is possible to prevent the development of gonorrhea in the great majority of cases. The possibility of preventing infection diminishes with the length of time that elapses before prophylaxis is used. Prophylaxis is carried out in the following manner:

The patient urinates, then washes his external genitalia with soap and warm water, then with a 1:5000 bichlorid of mercury solution. The anterior urethra is now filled comfortably full with 20 per cent argyrol, silvol or neosilvol solution, or a 2 per cent protargol solution, and the meatus held for five minutes. The glans penis should now be covered with a 33⅓ per cent calomel ointment, care being taken to place some within the lips of the meatus. Cotton should be applied to keep the ointment from being wiped away, and should be worn during the day or overnight. Instead of using an injection as above described the urethra may be irrigated with a 1:4000 potassium permanganate solution, or albargin 1:1000, followed by the calomel ointment application as already described.

CHAPTER III

ACUTE GONORRHEAL INFECTIONS

Gonorrhea may be acute or chronic and involve the anterior urethra only, the posterior urethra only, or both at the same time.

When limited to the anterior urethra, it is not so serious and, therefore, every means at one's disposal should be utilized to keep it so limited and to effect a cure before it has passed backward beyond the compressor urethræ muscle.

ACUTE ANTERIOR URETHRITIS

Acute anterior gonorrhea is an acute inflammation of the anterior urethra characterized by a purulent discharge containing gonococci and accompanied with pain and burning on urination and the cardinal signs of inflammation. It is caused by the gonococcus and its method of contraction is usually through sexual intercourse.

Opinions differ as to the interval which occurs between infection and the first symptoms. Some allege that the disease may appear as early as the second day, and some assert that it may not appear for several weeks. The usual *incubation period* is from three to ten days. The exact determination of this interval in any given case is of great importance with regard to treatment. It sometimes happens that the patient cannot himself tell, in consequence principally of his own carelessness, or neglect or lack of observation, but to the physician it is a matter of some concern to know whether he is treating a fresh or an old infection—an infection that he sees in its earliest stages, or after weeks have gone by.

Examination of the Patient.—The patient's history is taken. He must be carefully questioned as to any previous attacks. There is always the possibility that he may have syphilis, too. His genitalia, abdomen and thighs should be exposed in order that a thorough examination may be made. Any eruption, abrasion, abnormality or congenital defect should be noted. The prepuce should be retracted and a smear of the discharge made, stained and examined in the manner already described. The geni-

talia should then be cleansed with soap and water, followed by alcohol or bichlorid of mercury solution 1 : 5000.

Symptoms.—These are mild at first, usually increase rapidly, reach an acute condition, remain stationary for some time, then gradually subside and finally disappear entirely, or become chronic. The onset is the prodromal stage, which is characterized by a tickling, itching, and mildly stinging sensation at the meatus. This is soon followed by a slight serous

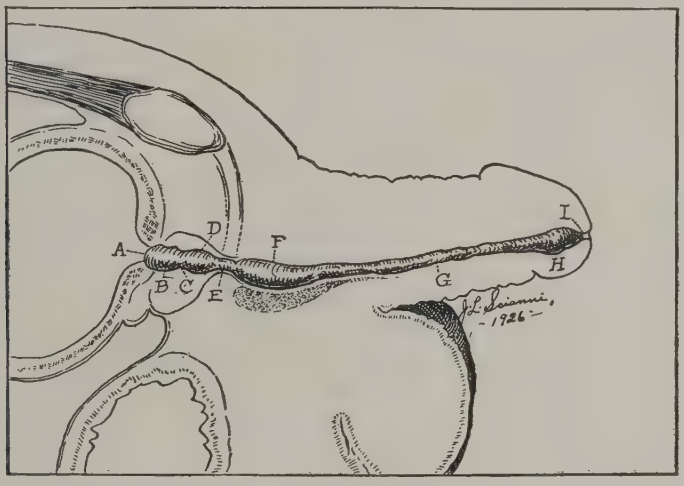

Fig. 2.—Cast of Normal Urethra in situ, Showing Points of Contraction and Dilatation.

	Diameter
A. Base of prostatic portion	33 French
B. Middle of prostatic portion	45 French
C. Indentation caused by verumontanum	
D. Apex of prostatic portion	30 French
E. Membranous portion	27 French
F. Bulbous portion	33 to 36 French
G. Middle of pendulous portion	27 to 30 French
H. Fossa navicularis	30 to 33 French
I. Meatus urinarius	21 to 28 French

or milky secretion which often glues the lips of the meatus together. There is a swollen, red, pouting appearance of the meatus and in voiding there is quite marked burning and irritation. There may be increased sexual desire caused by the congestion of the urethra and glans.

Should the patient indulge in intercourse with the idea that it will relieve him, it only serves to increase the severity of his symptoms and infect the woman with whom he has intercourse. After a few days the acute stage begins with an aggravation of all the above symptoms. The meatus

and glans penis become acutely inflamed, the edema and swelling of the meatus increases and may be so great as to interfere with urination. Especially is this true in men having a small meatus. This may extend to the prepuce and produce a phimosis or paraphimosis. The discharge becomes more abundant and is now a thick, yellow or greenish-yellow pus, which may be blood-stained. The pain may now be very severe, and on urination, the burning is so intense the patient likens it to the voiding of molten lead.

There may be constitutional symptoms such as malaise, chilly sensations, anorexia, backache and pains in the hips, perineum and testicles. The nervous and high-strung individual may feel that he is a very sick man.

There may be a lymphangitis of the penis and an inguinal adenitis, both of which may suppurate, though fortunately this is rare. The inflammatory process in the urethra extends into the corpus spongiosum and this can be felt as a thickened tender tube on the under surface of the penis. The inflammation and induration in the corpus spongiosum make it much less expansile than the corpora cavernosa, hence when erection occurs (and this is usually quite frequent and is due to the irritation in the urethra) there is a bowing or arching of the penis, *chordee* as it is called, which is exceedingly painful and often followed by slight bleeding from the urethra due to laceration of the thickened mucosa when it is stretched by the erection of the penis. The acute stage lasts about one week, then the severity of the symptoms begin to subside and the stage of decline sets in. The inflammation of the glans and penis subside gradually, the discharge becomes less abundant and more mucoid in character until there is only a slight drop of mucopus in the meatus in the morning on arising. This is known as the "morning drop."

When the patient voids his urine into two glasses, the first specimen is cloudy or shreddy and the second is clear. This is due to the fact that, with an uninfected bladder and posterior urethra, there is clear, clean urine in the bladder. Therefore, when the patient voids, he passes a clean urine through a dirty anterior urethra, washing the discharge from the anterior urethra into the first glass, making it cloudy or shreddy. When he voids into the second glass, having clear urine in his bladder and the urethra having been washed clean by the urine in the first glass, the specimen in the second glass is clear. This is known as Thompson's two-glass test and is used to differentiate acute anterior from acute posterior gonorrhea. To make the test of value the patient should have a good

quantity of urine in his bladder. The urine may be cloudy from carbonates, phosphates, or urates as well as pus, but, if a few drops of acid be added to some cloudy urine that has been boiled in a test-tube, it will clear up if due to carbonates or phosphates and remain unchanged if due to pus. If the cloudiness is due to urates, it will vanish when heated without the addition of acid.

Diagnosis.—The diagnosis is made by finding gonococci in the discharge under the microscope, by the symptoms, by the history and by the two-glass test.

Prognosis.—The prognosis is good provided the patient will follow directions, but even with every care a large proportion of cases will become posterior. Caulk says 90 per cent, and the author is inclined to believe he is correct.

Pathology.—We owe our knowledge of the pathology of acute anterior gonorrhea to Finger, Ghon and Schlagenhaufer, who inoculated criminals before execution and made immediate postmortem examinations. According to Keyes' summary of their investigation: "Thirty-eight hours after inoculation gonococci have only just begun to effect an entrance between the epithelial cells. The lacunæ of Morgagni were crowded with cocci; diapedesis had begun and intracellular gonococci were found among the few leukocytes on the surface of the epithelium. At the end of three days the inflammatory process was well under way. The surface of the mucous membrane was covered with pus, its epithelium infiltrated by bacteria from one side and leukocytes from the other. The inflammation showed four striking characteristics, *viz:* (1) The pavement epithelium of the fossa navicularis, although swollen with leukocytes, resisted the invasion of the gonococci almost absolutely; (2) the cylindrical epithelium of the penile urethra was generally invaded; (3) the invasion was most marked about the crypts and glands which were packed with pus and gonococci; (4) the subepithelial connective tissue, though showing every evidence of inflammation, contained few gonococci, except in the neighborhood of the crypts and glands."

The inflammation of the mucosa extends due to the irritation of the toxins of the gonococci which causes a "buckling" of the epithelial cells, just as a shingle roof warps under the influence of sun and rain. Gonococci penetrate between the buckled edges of the cells and dive deeper, repeating the process until large areas of cells are cast off, thus causing denuded areas which bleed easily. Later round-celled infiltration takes place and the areas become thick and lose their elasticity. The inflammation may extend

deeper, going beyond the submucosa and even involving the corpora cavernosa.

Complications.—See Chapter VI.

Treatment.—The treatment of acute anterior gonorrhea is hygienic, prophylactic, dietetic, internal and local medication.

Hygienic.—Instructions to the patient: Try to sleep at least eight hours; avoid exercise and heavy work; sleep on the side on a comfortable bed with light covering. Keep the bowels open. Take a hot sitz-bath twice

FIG. 3.—BUTTERFLY DRESSING OVER GLANS. (Taylor)

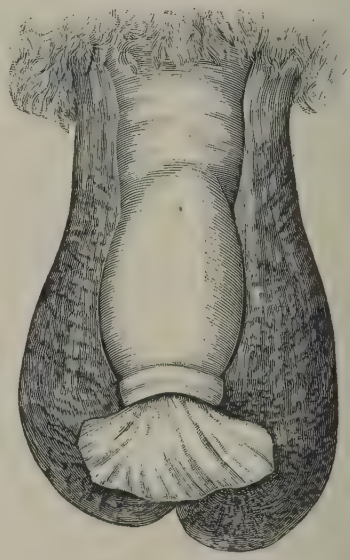

FIG. 4.—BUTTERFLY DRESSING WITH THE PREPUCE OVER IT. (Taylor)

a day remaining seated in the water fifteen minutes. Keep the penis as clean as possible, using a butterfly dressing, which consists of two layers of gauze, 4 inches square, with a hole in the center. Retract the foreskin, push the glans through the hole in the gauze to the coronal groove, then let the foreskin come forward over the glans and the protruding gauze will catch the discharge.

Instead of the butterfly dressing a gonorrhea bag may be used, changing the cotton at every voiding. Do not place cotton under foreskin so as to hold it tight against the external meatus as it may result in forcing pus backward to the posterior urethra. Drink water freely; for the more water the patient drinks the oftener he urinates, and the cleaner he keeps

his urethra, the quicker he will be cured. Destroy all cloth or cotton contaminated by the discharge and do not wipe the discharge on a towel or get it on any article or object that another person may use, as the innocent may become infected. Avoid infection of the eyes by careful disposal of the discharge and washing the hands with soap and water after handling the penis. Void before getting into the bathtub and wash out the tub after getting out. Do not go in a swimming pool and possibly subject yourself and others to the danger of gonorrheal ophthalmia. Avoid sexual intercourse and sexual excitement, for both are exceedingly harmful; the former especially so to both parties. The writer believes that intercourse at this time should be punishable by imprisonment and fine.

Prophylactic.—The prophylactic treatment may be used when one has been exposed to possible infection. Any illicit intercourse may result in infection, regardless of the social position of the parties involved. The prophylactic treatment consists in thorough cleansing of the penis, testicles, thighs and lower abdomen with germicidal soap. The patient then voids his urine and the physician injects a 20 per cent solution of either argyrol, silvol or neosilvol, or a 2 per cent solution of protargol, mercurochrome or nargol into the anterior urethra. The patient holds the lips of the meatus together and retains the solution for five minutes. He is then given a prescription for a tube of calomel cream, composed of calomel 33⅓ per cent in vaselin or lanolin. This is applied all over the glans and penis and the lips of the meatus are separated and some of the ointment pushed between them. Cotton or gauze is then applied over the penis and kept on for twelve hours. This is probably 100 per cent effective if carefully carried out within two or three hours after intercourse and is about 50 per cent effective if done within twenty-four hours, and much less beyond this limit.

Dietetic.—The dietetic treatment consists in a proper regulation of the food and drink. The diet should consist of wholesome food. Avoid strong tea and coffee, stimulants, rich dishes, radishes, rhubarb and condiments.

Eat fresh fish, chickens, toast, thin soup, green vegetables, boiled rice, milk puddings, eggs, and butter in moderation.

Drink plenty of milk, weak tea, plain or aërated waters, and barley water. Avoid vigorous exercise, especially exercises to which you are accustomed, like tennis, wrestling, handball, and rowing. Keep in the horizontal position as much as possible.

Internal Medication.—The urine should be made alkaline in the acute stage in order to diminish the pain and burning of urination. This is best

accomplished by the administration of alkalis, potassium citrate in 30 grain (2 grams) doses every six hours being best, although sodium or potassium bicarbonate may also be used in the same dosage. Methylene-blue in 1 grain (0.065 gram) doses three times a day may be given. Fluidextract of triticum and uva ursi in 20 minim (1.3 c.c.) and santal oil or balsam of copaiba in 10 minim (0.6 c.c.) doses. Compound salol (salol, 3½ grains; balsam of copaiba, 10 minims; oleoresin of cubeb, 5 minims; pepsin, 1 : 3000, 15 grains) is also recommended to allay the pain and burning on urination.

One of the following formulas may also be prescribed for oral administration:

℞

Ol. santal.	♏x	(0.6 c.c.)
Copaib.	♏x	(0.6 c.c.)
Ol. cinnam.	♏i	(0.06 c.c.)

M. et F. tal. cap. No. 36

Sig. One capsule three times daily after meals and at bedtime.

℞

Pot. bicarb.	℥i	(30.00 gm.)
Tr. hyosc.	℥ss	(15.00 c.c.)
Fldext. kav.	℥ss	(15.00 c.c.)
Aq. dest. q. s.....	℥viii	(240.00 c.c.)

Ft. sol.

Sig. Two teaspoonfuls in water two hours after meals and at bedtime.

The old Lafayette Mixture, although it has a disagreeable taste, often gives great relief. Its formula is:

℞

Copaib.	℥i	(30.00 c.c.)
Liq. pot.	℥ii	(7.50 c.c.)
Ext. glycyrrh.	℥ss	(15.00 gm.)
Sp. aeth. nitrit.	℥i	(30.00 c.c.)
Syr. acac.	℥vi	(180.00 c.c.)
Ol. gaulth.	♏xvi	(1.00 c.c.)

Ft. sol.

Sig. Teaspoonful in water three times daily after meals.

℞

Pot. cit. .....℥i (30.00 gm.)
Tr. bellad. .....♏iiss(10.00 c.c.)
Tr. hyos. .....℥ss (15.00 c.c.)
Aq. dest. q. s. ad.....℥iv (120.00 c.c.)
Ft. sol.

Sig. Two teaspoonfuls in water three times daily after meals and at bedtime.

℞

Liq. pot. .....℥ss (15.00 c.c.)
Fldext. uvae ursi .....℥iss (45.00 c.c.)
Fldext. tritic. .....℥iss (45.00 c.c.)
Aq. dest. q. s. ad. .....℥iv (120.00 c.c.)
Ft. sol.

Sig. One teaspoonful in water three times daily after meals.

℞

Liq. pot. ..... ℥ii (8.00 c.c.)
Tr. hyosc. ..... ♏iiss (10.00 c.c.)
Aq. cinnam. q. s. ad. ... ℥ii (60.00 c.c.)
Ft. sol.

Sig. One teaspoonful in water three times daily after meals and at bedtime.

Local Treatment.—There is a diversity of opinion as to the time to begin local treatments. Many argue that it is unwise to use local measures in the very acute stage, while others maintain that we are dealing with a germ infection, the germ having a decided tendency to burrow under the mucous membrane and lodge in the lacunæ and crypts of Morgagni, consequently the earlier the antiseptic is used, the greater the chance of eradicating the infection.

The author is in accord with the latter view, consequently he begins local treatments at the earliest possible moment.[1] The patient is instructed to void into two glasses, to determine whether it be anterior gonorrhea. He is then instructed to cleanse his penis thoroughly with soap and water. The physician, using a small hand syringe with a conical soft rubber nozzle, and inserting the tip of the nozzle between the lips of the meatus and gently compressing them against the nozzle, injects

[1] A word of caution may be necessary to the inexperienced, as great harm may follow irrigations if the condition is very acute. Therefore, when in doubt, antiphlogistic measures should be employed, until the more acute symptoms have subsided. When this has occurred, treatment is inaugurated with anterior injections of very mild solutions, such as argyrol 10 per cent; neosilvol 10 to 15 per cent; acriflavin 1: 10,000.

gently into the urethra a small amount, usually 1 or 2 drams, of the solution desired. As the nozzle of the syringe is removed the patient grasps the tip of the penis, compresses the lips of the meatus firmly together, thus retaining the solution in the urethra. The physician then dries the meatus carefully and thoroughly and seals it tightly with collodion or adhesive plaster. A large pledget of cotton is then tied about the glans penis and the

FIG. 5.—BULB URETHRAL SYRINGE. (Keyes)

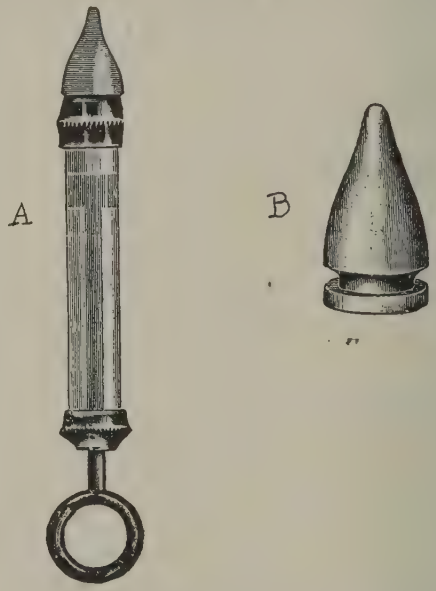

FIG. 6.—*A*. URETHRAL INJECTION SYRINGE. *B*. URETHRAL TIP, SOFT RUBBER.
Capacity ½ or 1 ounce, glass barrel, hard rubber-mounted and soft rubber tip.

patient is instructed to retain the solution until the next voiding when the collodion or plaster dressing is removed.

This treatment should be carried out twice a day and the patient instructed to use the same injection, or a similar one, night and morning, retaining it for five minutes each time. This is the method of E. G. Ballenger of Atlanta and has proved very satisfactory in his hands, although my results have not been so favorable. The cases that respond best to this method are those seen early when the discharge is mucopurulent and the symptoms subacute. The author is inclined to believe that sealing the solution in the urethra increases the tendency to the development of posterior gonorrhea.

The solutions used for this purpose may be argyrol, neosilvol or silvol 20 per cent, protargol, or nargol ½ to 2 per cent, mercurochrome 1 to 2 per cent. acriflavin 1:4000. George Gilbert Smith of Boston recommends hegonon ⅛ or ¼ per cent.

Other methods of local treatment consist in administering anterior injections, simply letting the patient retain the solution for five to ten minutes once or twice a day, and having him use some other solution himself in the same manner every three or four hours. The patient should be told to release his grasp on the meatus and allow the solution to escape the moment he experiences a desire to urinate, or he is apt to force it backward into the posterior urethra and give rise to posterior gonorrhea.

It is wise to instruct him to drink two glasses of water on retiring so he will have to void during the night, when an injection can then be given. Acriflavin, 1:4000, as advocated by Barringer, has proven very efficacious in the author's hands.

Irrigations of the anterior urethra may be used instead of hand injections. The solution should be quite warm, 105° F., and the receptacle elevated only 2 feet above the level of the penis, so as to avoid too much pressure against the external sphincter. The following solutions are serviceable: Potassium permanganate, 2 to 8 grains (0.13 to 0.52 gram) to the quart; acriflavin, 1:10,000; albargin, 1:1000; protargol, 1:500; mercury oxycyanid, 1:8000 to 1:5000; picric acid, 1:2000 to 1:500; mercury perchlorid, 1:30,000 to 1:20,000. Mercury solutions are frequently very irritating, so it is best to begin with very weak ones. At least a quart of the irrigating solution should be used at each treatment.

The irrigation should be followed by an injection of a stronger solution, which should be held in the urethra for five minutes by compressing the lips of the meatus. Permanganate may be followed by mercurochrome, 1 to 2 per cent; acriflavin, 1:10,000, by acriflavin, 1:4000; and protargol, 1:500, by protargol 0.5 to 2 per cent, argyrol 10 to 20 per cent or neosilvol 10 to 20 per cent. After the gonococci have disappeared and a mucopurulent discharge persists, astringent injections may be used, such as: Copper sulphate 0.25 to 1 per cent; zinc sulphocarbonate, 1:4000 to 1:2000; zinc sulphate, 1:4000 to 1:2000; zinc permanganate, 1:8000 to 1:4000, and equal parts of sulphates of alum, zinc and copper combined, 1:4000 to 1:2000.

It should be remembered that any urethral or bladder instrumenta-

tion or medication often produces a peculiar nervous reflex which may cause the patient to become weak, pale, clammy with perspiration, nauseated, and even lose consciousness, falling in a dead faint if not put in a prone position at the first symptom. It is, as a rule, nothing serious, but in the neurotic, high-strung boy, or in those of the status lymphaticus type, the condition might prove disastrous.

Boyd uses acriflavin, 1:1000. With the patient lying on his side, he passes a catheter into the anterior urethra and injects the solution gently while the catheter is being withdrawn. No attempt is made to retain the solution, except that the patient remains on his side for ten minutes and refrains from voiding as long as possible.

I feel that better results are obtained with weaker solutions of acriflavin, as the stronger ones often cause irritation and aggravate the inflammation and may even cause a stricture; therefore, I agree with Barringer, who advises the use of acriflavin, 1:4000 solution, using it only once a day and having the patient use some other solution himself every three or four hours.

Treatments are given daily, or twice daily, by the physician, until repeated tests prove that the gonococcus has been eradicated. This requires from four to eight weeks for accomplishment, those lasting eight weeks being in the majority. Sounds should be passed after all acute symptoms have subsided. They not only tone up the mucosa by the gentle pressure they exert, but also smooth out any soft infiltrations and squeeze gonococci from the lacunæ and crypts. Gentle massage of the urethra over the sound adds to its efficacy.

When may we consider a patient with anterior gonorrhea cured? Our rule is to have at least seven gonococci-free smears and cultures. After the urethroscope has shown the anterior urethra to be in a healthy condition and after the repeated passage of sounds and massage of the anterior urethra over the sound, the anterior urethra is injected with a 1:500 silver nitrate solution to stimulate a reaction and discharge which when examined must be gonococci-free and culture-negative. The patient rests a week without treatment and then is given a hypodermic of gonococcic vaccine 0.25 c.c. (50,000,000 dead gonococci) and an injection of silver nitrate 1:500, to promote further discharge and if the smear of the discharge that is produced is gonococci-free and culture-negative, the patient is considered well.

Even after such thorough tests, I have seen relapses occur. Hence the necessity for care in pronouncing a patient cured.

Injections.—Recommended as injections are the following:

Thallin sulphate: Injections containing 1 to 2 grains (Casper).

Targesin: Colloidal diacetyl-tannin-silver albuminate. Much praised to-day in German clinics. For injections in acute gonorrhea, 1 to 3 per cent solutions.

Sophol: Silver formonucleinate (sensitive to light and heat), for instillations in gonorrheal ophthalmia, sophol, 0.3 grain; aq. dest., 10 c.c.

Collargol: Colloidal silver, for injections in acute gonorrhea, 1:400 solution.

Necaron: Silver sodium cyanate: Injections, 1:2000; irrigations, 1:10,000.

Metaphen: Mercuri-nitro-cresol, 1:10,000 to 1:5000 solution.

Iodargol: Colloidal iodin, 1:3000, and 1:40,000 solutions.

Reargon: Glucosid of silver gelatose, for daily injections in acute gonorrhea, 5 per cent solution.

Hegonon: Ammonio-albuminate of silver nitrate, double salt, very soluble; in acute gonorrhea, 0.25 to 1 per cent solutions.

The small hand syringe best adapted for injections is the "Asepto."

ACUTE POSTERIOR URETHRITIS

When the gonococci have passed beyond the compressor urethræ muscle and invaded the posterior urethra, inflammation produces more serious symptoms than when it was confined to the anterior urethra.

The causes of acute posterior gonorrhea are various, including, as they do, errors in treatment and errors in the patient's mode of life. The predisposing causes are: A small meatus; indiscretions in diet and exercise; the indulgence in alcoholic beverages; sexual excitement and intercourse, and the failure to follow prescribed treatment. It is a fact, however (and one that is rarely mentioned), that many cases result in posterior involvement regardless of the utmost care and painstaking efforts in carrying out the treatment, both on the part of the attendant and the patient.

Keyes cites a case of a young man who went to bed, lived on a simple diet, followed out his treatment to the letter and yet his case became posterior and he had nearly every possible complication.

It stands to reason, however, that those who obey instructions are far more likely to avoid posterior gonorrhea than those who disregard them; but in justice to the patient, as well as to the consultant, one should be exceedingly guarded at first in the expression of a prognosis, making it

especially emphatic that posterior gonorrhea may result despite the utmost care and the most efficient treatment.

Symptoms.—There are three types of cases: Those with practically no subjective symptoms; those in whom subjective symptoms are mild; and those with very severe subjective symptoms.

In the first type, the infection passes backward so insidiously that the patient is unaware of it and, except for the two-glass test, we would be unable to convince him that he is not almost well, especially because the discharge usually becomes so much less, or practically ceases entirely. A microscopical examination of the discharge and the two-glass test, however, will prove that the disease has passed backward beyond the compressor urethræ muscle and that gonococci are still present.

In the second type, there is some frequency and burning on urination with an uneasy feeling and a sense that the bladder is incompletely emptied after voiding. The discharge becomes less because the patient voids so frequently that the urine washes it away.

In the third type, the symptoms are all markedly aggravated. The frequency and burning become intense and are accompanied by severe tenesmus and the last few drops of urine are often blood-stained. Nocturnal emissions are frequent and often painful and may be streaked with blood. There may be malaise, anorexia, fever and chilly sensations. The patient himself feels acutely sick and is very depressed and despondent, though the discharge may be so slight as to make him think it has ceased entirely.

In any of the three types of acute posterior gonorrhea, both glasses will be cloudy when the two-glass test is used, showing that the urine in the bladder and posterior urethra is now infected.

Should the patient void so frequently that there is very little urine in his bladder, in order to make the two-glass test of value, the anterior urethra should be cleansed thoroughly with boric acid solution and specimens, however small, be secured which will show cloudiness in both glasses in the case of posterior urethritis.

Diagnosis.—The diagnosis is made by the history, by finding gonococci in the discharge, by the symptoms, and by the above test.

Prognosis.—The prognosis depends upon the care with which the patient follows instructions and the complications that develop. It is a fact that many cases go from bad to worse, regardless of whatever care or treatment is followed out. The author has repeatedly seen cases limited to a bland diet, taking hot baths and doing everything to get well, who

nevertheless were visited by every complication. No case can be cured in less than six weeks and many have been known to last for months, even years.

Treatment.—Here again we have two schools, one advocating immediate local treatment and the other deferring all treatment—injections, irrigations, etc.—until the acute symptoms have subsided. If this plan is adhered to, there will be fewer complications and less long-drawn-out cases.

Internal Medication.—In such cases, give alkalis, potassium citrate or acetate, 30 grains, four times a day with belladonna and hyoscyamus, a good combination being:

℞

Pot. cit. .....℥i (30.00 gm.)
Tr. bellad. .....♏iiss(10.00 c.c.)
Tr. hyosc. .....℥ss (15.00 c.c.)
Aq. dest. q. s. ad.....℥iv (120.00 c.c.)
Ft. sol.

Sig. Two teaspoonfuls three times daily after meals and at bedtime.

℞

Liq. pot. .....♏iiss (10.00 c.c.)
Fldext. urae ursi .....℥iss (45.00 c.c.)
Fldext. tritic. .....℥iss (45.00 c.c.)
Aq. dest. q. s. ad. .....℥iv (120.00 c.c.)
Ft. sol.

Sig. One teaspoonful three times daily after meals and at bedtime.

The antiblenorrhagics, such as santal oil, copaiba and cubeb, may also be used and are serviceable in allaying tenesmus and burning, but have a disagreeable taste and smell and often upset the digestion. Santal-wood oil is perhaps the best and can be prescribed in gelatin capsules 10 to 15 minims (0.6 to 1.00 c.c.) three times a day after meals.

In the acute cases put the patient to bed and have him drink large quantities of water. Keep his bowels open and use the same diet prescribed in acute anterior gonorrhea. Prescribe hot sitz-baths frequently and apply hot fomentations about the penis, perineum and bladder. An opiate may be necessary and codein (1 grain) when the patient is suffering, is satisfactory, although a suppository of pulv. opium, belladonna and hyoscyamus may be used instead. Thus:

℞

Pulv. opii ..... gr.vi (0.4 gm.)
Ext. bellad. ..... gr.i (0.06 c.c.)
Ext. hyosc. ..... gr.ii (0.13 c.c.)
Ol. theobrom. ..... q. s.
Ft. suppos. No. 6
Sig. One when suffering.

If belladonna and hyoscyamus have been given internally do not add them to the suppository. Gauze or cotton saturated with lead and opium lotion and applied about the penis and perineum may also help.

After the acute symptoms have subsided the compound methylene-blue pill of any of the good pharmaceutical houses may be used. Urotropin (10 grains) and methylene-blue (1 grain) may be given three times a day after meals and at bedtime. Urotropin, however, should always be dissolved in water as the tablets are so hard they may not be dissolved in either the stomach or intestines. [It is advisable to combine acid sodium phosphate (15 grains) or sodium benzoate (5 grains) with urotropin. Tablets of urotropin and acid sodium phosphate are now put up by reputable manufacturers and can be obtained from almost any drug store.]

It should be remembered that the increased acidity produced by urotropin and acid sodium phosphate may cause burning and frequency of urination. Urotropin has also been known to cause hematuria and should be discontinued if this occurs.

Internal medication is valuable only as an aid to local treatment and is *in no sense a cure for gonorrhea.* The nauseating, disagreeable taste and smell of the balsams often upset the digestion and in such cases may do more harm than good. They have a very soothing effect, however, on the irritated urinary tract and often afford relief to sufferers from tenesmus and strangury, that no other drugs will give.

Local Treatment.—If the diameter of the external meatus is smaller than 24 French scale, the result resembles a stricture of the urethra, interfering with the flow of urine and the free drainage of the discharge, thus increasing the difficulty and time of effecting a cure. Therefore, when the external meatus will not admit a number 24 French bougie, a meatomy should be done. This is performed as follows: Inject novocain or alypin, 1 per cent in the lower half of the meatus and backward for one-half inch. An incision is then made in the midline of the floor of the urethra and mucosa of the glans large enough to admit

a 30 French bougie. The cut edge of the mucosa of the urethra and that of the glans should then be sutured together (as advocated by Barney) on each side, with No. 0 catgut.

After the acute symptoms subside we start local treatments. In the mild types we begin at once. These may be given in two ways: either by hydrostatic pressure from the meatus (Valentine method) or by the introduction of a 12 French soft rubber catheter. A 1 per cent solution of alypin is injected into the anterior urethra and held for five minutes, the patient being told to relax his sphincter so as to allow some to trickle back into the posterior urethra and bladder. We now have the choice of irrigations or instillations. The author gets better results from instillations, though it has been his experience that the cases that do best are those in which the methods of treatment and the solutions used are changed from time to time.

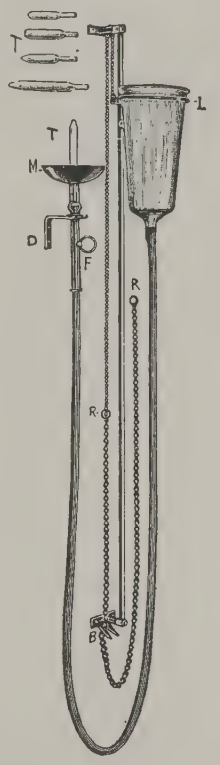

FIG. 7.—VALENTINE'S URETHRAL IRRIGATOR.

With sliding metal bracket.

Unless the urine is quite cloudy he usually begins with irrigations of acriflavin, 1:10,000, followed by stronger solutions, increasing the strength after one or two treatments until 1:4000 is used. The patient lies upon the table on his back, the penis having been first washed and dried and alypin 1 per cent injected.

With a small one-half ounce Dakin syringe having a soft rubber nozzle, the anterior urethra is gently filled with 1:10,000 acriflavin and the patient told to compress the lips of the meatus and hold the solution in the urethra for five minutes. This is then allowed to escape and the urethra again filled with the same solution, which the patient is told to hold in the urethra and relax the cut-off muscle so as to allow the solution to flow backward into the posterior urethra and bladder.

In a day or two the acriflavin is increased to 1:4000. If the urine is quite cloudy, irrigations of potassium permanganate, 1:2000 to 1:1000 at a temperature of 40.6° C. (105° F.) are given either by the Valentine method, or by passing a 12 French soft rubber catheter into the bladder,

filling the bladder, then removing the catheter and allowing the patient to void the solution.

This is followed, when permanganate is used, by an injection of mercurochrome 1 per cent into the anterior urethra, the patient being told to relax the cut-off muscle allowing it to pass backward into the posterior urethra and bladder. The meatus is held for five minutes and the patient told to hold the solution in the bladder until the next time he voids.

As before stated, instillations of mild solutions have seemed to give the author the best results and those he prefers are: Acriflavin, 1: 10,000 to 1: 4000; protargol 0.5 to 1 per cent; silvol or argyrol 15 to 20 per cent; lunosol 10 per cent; and neosilvol 10 to 15 per cent. For irrigations, potassium permanganate, 1: 5000 to 1: 2000; albargin, 1: 1000; protargol, 1: 500; acriflavin, 1: 10,000, may be used.

After using one of the above solutions as an irrigation, it is wise to follow with an instillation or injection of the same or a different remedy in stronger solution. After irrigating with permanganate, an instillation of mercurochrome 1 to 2 per cent may be given. An irrigation of protargol, 1: 500, may be followed by an instillation of the same remedy in 1 to 2 per cent solution and a 1: 10,000 acriflavin irrigation may be followed by an instillation of the same drug in 1: 4000 solution.

When the urine becomes clear and only contains shreds and *all acute symptoms have completely subsided,* preference is given to silver nitrate, using irrigations of 1: 10,000, gradually increased to 1: 5000, and followed by instillations of 1: 1000, up to 1 per cent.

When the gonococci pass beyond the cut-off muscle and enter the posterior urethra, there are numerous and splendid hiding-places open to them, *viz.,* the sinus pocularis or uterus masculinus, the ejaculatory ducts and seminal vesicles and the prostatic ducts and acini of the prostate gland. The author is, therefore, convinced that no case of gonorrhea becomes posterior without involvement of the prostate and vesicles and few cases are cured unless these structures are subjected to thorough treatment. Therefore, after the acute symptoms have subsided and the gonococci have diminished in number, we begin massage of the prostate and vesicles, but oh, so gently. No pain or trauma must be produced at this time, for *failure to be gentle may result in causing an acute prostatitis or an epididymitis.* Massages are first given once a week, then twice a week, gradually using more pressure as the sensitiveness becomes less marked. If any fluid is expressed after massage this should be collected and examined for gonococci. Massage of the prostate is not a haphazard measure,

and to be effective and not detrimental must be done properly. It is best to pass the finger to the limit of the right or left lobe of the prostate and massage outward and downward, never from side to side across the urethra.

As the gonococci disappear and the symptoms subside, sounds should be passed to promote absorption of any indurated or thickened areas that may have been produced in the urethra and to empty its follicles of any pus, mucus or gonococci. By gently massaging over the sound its benefits are enhanced. An irrigation should *always* follow the passage of a sound. In fact, it is a good rule to remember that any instrumentation of the urethra or bladder should be followed by an irrigation or instillation.

When gonococci can no longer be found in a smear of the fluid expressed after massage and from the discharge occasioned by the passage of sounds, or the injection of strong solutions of silver nitrate, cultures of the urine should be made following massage and the introduction of sound. One-fourth c.c. of gonococcic vaccine (50,000,000 dead gonococci), too, given at intervals of four days, increasing the dose gradually each time, unless there is some reaction, also seems to aid in dislodging the gonococci and enabling one to find them in smears or cultures which previous to their administration were negative.

The urethroscope should be passed to see that the urethral mucosa is in a healthy condition and no follicles or crypts are inflamed or discharge pus.

When is a patient cured of acute posterior gonorrhea? Our rule is to have nine gonococci-free smears and cultures made, following massage of the prostate and vesicles and the passage of sounds and the administration of gonococcic vaccine. Also, after injecting strong solutions, *e.g.*, 0.5 to 1 per cent solution of silver nitrate into the urethra to provoke a discharge which must be gonococci-free. The urethra, too, must appear practically normal through the urethroscope and cultures of the urine must also be negative. The patient is then given a week's rest and smears and cultures must be again negative and then a two weeks' rest is prescribed when the same procedure must be complied with. If cultures and smears are then negative one may consider the patient cured.

CHAPTER IV

CHRONIC GONORRHEAL INFECTIONS

CHRONIC ANTERIOR URETHRITIS

This is so rare a condition as to be almost unknown, for in the vast majority of cases when acute anterior gonorrhea has lasted long enough to become chronic it has almost invariably passed beyond the compressor urethræ muscle and become posterior.

Many textbooks state that chronic gonorrhea is due to improper treatment, either on the part of the patient or attendant. If this be true, then a large percentage of patients receive improper treatment, for the majority of cases become chronic; but chronic posterior rather than chronic anterior cases. I should rather say that chronic anterior urethritis is of two kinds—with and without gonococci; old organisms of various sorts having become so firmly and deeply entrenched in the follicles and lacunæ of the anterior urethra or in Cowper's ducts and glands that it was impossible to dislodge them.

Symptoms.—These vary, but there is usually a slight discharge seen only on arising, some slight irritation on urination and the urine contains shreds. Beyond this, the patient is oblivious to the fact that he has gonorrhea and in many cases neglects his treatment and indulges in sexual and alcoholic excesses, mainly because he has become disgusted and discouraged. Many cases have no other symptom beyond a slight urethral discharge, which is aggravated by any excess.

Diagnosis.—The diagnosis is made by the history, by finding the gonococcus in the discharge, by the two-glass test after thoroughly washing out the anterior urethra, and by the urethroscope, which may reveal folliculitis.

Prognosis.—The prognosis is good if the patient follows instructions, but all infected follicles and glands must be freed of gonococci.

Treatment.—The urethra should be examined with the urethroscope and bougies à boule to determine the location of the infection and the presence of hard infiltrations or strictures, and appropriate treatment instituted for the pathology found. Hot irrigations, 40.6°C. (105°F.), of

warm permanganate, followed by an injection of mercurochrome, 1 to 2 per cent; or hot irrigations of acriflavin, 1:10,000, followed by an injection of the same 1:4000. Meroxyl may be used in 1:2000 to 1:1000 solution for irrigations and in 1:5000 for instillations, and it should be made fresh daily. But best of all are hot irrigations of silver nitrate, 1:10,000, followed by injections of the same 1:2000 to 1 per cent.

Sounds are passed, increasing in size to tolerance and massaging the urethra over the sound, or the Kohlmann dilator to 35 or 40 French may be used. The use of the endoscope and the injection of the infected follicles with silver nitrate, 20 per cent, through the Livermore follicular needle, or the destruction of the follicles by fulguration are indicated. After the gonococci have disappeared and the urethral discharge still persists, astringent solutions may be used. Any of the following are suitable: Copper sulphate, 1:1000 for irrigations and 0.5 to 1 per cent for instillations. Zinc sulphate, 1:2000 to 1:1000 for irrigations and 1:500 to 1:250 for instillations. Alum sulphate, 1:4000 for irrigations, to 1:500 for instillations.

Internal medication and hot sitz-baths as prescribed in acute gonorrhea may also be used.

CHRONIC POSTERIOR URETHRITIS

This is a term used to describe a common result of pathological changes. It is by far the most prevalent of all the gonorrheas and is not necessarily due to improper treatment, as claimed by some writers in whose clinics we see the same proportion of chronics that occur elsewhere; for many patients who follow instructions and take treatment religiously have it despite everything they do.

It is a fact, however, that many cases become chronic because the patients will not follow instructions. This is the result of the idea that "gonorrhea is no worse than a cold," an idea so firmly rooted in the public mind that no mere words of ours can hope to eradicate it. Therefore, these patients continue to drink, exercise and even indulge in sexual intercourse, which, of course, tends to complicate and prolong the disease. With so many excellent hiding places, such as the ejaculatory and prostatic ducts in the posterior urethra, it is not difficult to understand why posterior gonorrhea is so resistant to treatment.

Symptoms.—Often the only symptom is a slight morning drop and shreds in the urine. In some cases, however, there may be slight irri-

tation on urination and some frequency and even nocturia is complained of. There may also be vague pains in the perineum, rectum, scrotum, penis, lower abdomen, back or thighs. Lassitude and a general feeling of depression, with a tendency to melancholia, may occur.

On rectal examination the prostate and vesicles may be found enlarged and boggy, or hard and tender. In others, they may be small and indurated and no fluid will be expressed until they have been massaged several times. In the former, however, a mucopurulent discharge is expressed from the meatus, or can be brought from it by stripping the urethra.

Chronic gonorrhea should be recognized rather easily by the history, by a watery discharge, which intermits the symptoms, and by the finding of the gonococcus in the discharge, or in urine voided immediately after massaging the prostate and vesicles. The *diagnosis* may be difficult at times, and other organisms may be the cause of a slight, sticky secretion at the meatus in the morning. A non-gonococcal urethritis must be differentiated. The two-glass test needs a third glass for urine from the bladder. Cultures and the complement fixation test are indicated.

Prognosis.—These patients are often the most difficult to cure, even by expert hands, and it requires months, and sometimes years, to effect a cure.

Treatment.—The treatment of chronic posterior gonorrhea often taxes the patience and perseverance of both attendant and patient, for I know of no curable disease more difficult to cure, or whose successful handling requires more ingenuity and tact. Everything that has been recommended for the treatment of acute posterior gonorrhea may be used and, in addition, massage of the prostate and vesicles two or three times a week, the passage of increasing sized sounds once a week (*never oftener*) or dilators to 35 or 40 French. Injections of 20 per cent silver nitrate into the follicles and utricle through the Livermore follicular needle, or destruction of the follicles by fulguration; hot irrigations of silver nitrate, 1:10,000 to 1:5000, followed by instillations of the same in solutions up to 1 per cent. Where the vesicles are markedly involved or in persistent cases where they are only slightly palpable, vasotomy and injection of the vesicles through the vasa with any of the mild silver preparations such as argyrol, silvol, etc., or with mercurochrome 1 to 2 per cent, or as recently recommended by Rolnick, aristol in olive oil; or by Belfield's iodized oil, which consists of iodol 10 grams in cod-liver oil 40 c.c., or thymol iodid 10 grams in cod-liver oil 30 c.c. Belfield and Rolnick state

that either of these clears the vesicles of gonococci and of pyogenic bacteria commonly found in them. Injection of the vesicles can also be done through the ejaculatory ducts through the McCarthy panendoscope with its special attachments, or through the Swinburne or Young posterior urethroscope with the Young or Delzell ejaculatory duct needle. This, however, is a delicate and difficult procedure and can only be successfully and harmlessly done after much study and practice. Heat in the treatment of gonorrhea has been recommended and used in the form of hot irrigations, by electricity or by water-heated sounds and diathermy. None of

Fig. 8.—Livermore's Follicular Needle.

these, however, has proved of distinct value, although some observers have reported a few successes.

It is known that the gonococcus is exceedingly susceptible to heat and is readily killed outside of the body at 45° C. (113° F.). Nevertheless, it is so resistant to heat, medicine and everything else when in the body that we have never yet found a remedy that is a specific and never will until some diffusible drug which is antiseptic and harmless to the tissues is discovered that, when placed in the urethra, will diffuse easily through the corpus spongiosum to the skin.

Some observers have reported the disappearance of gonococci in patients following attacks of high fever. This has not been the experience of the author and, in fact, he has repeatedly seen a return of an old gonorrhea long thought cured, following a severe attack of malaria or typhoid fever.

When is chronic gonorrhea cured? This is a very difficult question to answer, for despite our best efforts, relapses may occur even after the most thorough and painstaking examinations.

Our rule is to have nine gonococci-free smears and cultures, after the passage of sounds and dilators, massage of the prostate and vesicles, the injection of strong solutions of silver nitrate and a healthy appearing urethra as seen through the urethroscope; also, negative smears and cultures following the administration of vaccines and perhaps a negative complement fixation test, although in the author's experience the last is unnecessary and, on account of its complexity and delicacy and the many chances of error, must not be relied upon, except where its accuracy can-

not be questioned. We should bear in mind also that the complement fixation test may be positive long after the gonococcus has been eradicated.

The reason that chronic gonorrhea is so difficult to cure is due to the numerous splendid hiding places for gonococci that line the urethra. In the anterior urethra there are the ducts of the para-urethral follicles, those of Cowper's glands, the crypts of Morgagni and the numerous follicles; while in the posterior urethra, although the follicles are few, there are the prostatic ducts and acini of the prostate, the sinus pocularis and the ejaculatory ducts leading to the seminal vesicles and on down the vasa to the epididymes. Here they may remain for years, elaborating their toxins, thus keeping their host below par, although he may be ignorant of the true cause of his lack of well-being.

This last statement is borne out by Layne, who found gonococci eighteen years after infection. Ligler reported a case of eleven years' duration. The author has seen cases after twenty years' duration. Wolbarst says they may persist for many years, he having found gonococci in clear urine without shreds. Saxe found them in cases from six to eighteen years' duration.

Rathbun and Dexter state that many cases of uncured gonorrhea have no subjective or apparent objective symptoms and freedom from pus cells in the expressed prostatic fluid is not an evidence of cure and that a Gram-negative diplococcus does not mean gonococcus until proved so by culture.

Thomson agrees with Wolbarst, Saxe, Rathbun and Dexter. Hartman cites a case which, after ten years under treatment in all the capitals of Europe, infected a woman with gonorrhea. Luys states that infection may occur eight, ten or even fifteen years afterwards.

Other Forms of Treatment.—Intravenous Therapy.—Much attention has been given of late to the chemotherapy of gonorrhea. Acting on the principle that the gonococcal area may be sterilized by means of intravenous injection, the attempt has been made and success reported in many instances. The author's results, however, do not coincide with these reports.

Injections of glucose were first employed by Scholtz, of Königsberg. His theory was based upon the property, now well established, that a hypertonic solution of glucose produced a copious diuresis. The results are acknowledged by a French authority to be excellent. The cure is complete in eight days to a fortnight, with the occasional use of protargol. At first, Scholtz gives 20 grams of a 50 per cent solution. In the usual

cases, where treatment begins as soon as possible, five to six injections are given in from six to ten days.

An independent investigation into the effects of intravenous injections of glucose has been reported in the Czecho-Slovakian medical journal (*Bratislávské Lékárské Listy,* 1926, 5 : 212). With regard to intravenous injections in gonorrhea, the theory of Dale takes a prominent place. The injections of hypertonic solutions appear to have an effect somewhat similar to that of proteins, in which they promote the number and activity of the leukocytes. But it seems more likely that they act like salvarsan and, while they do not actually destroy, establish conditions highly unfavorable to the growth of the gonococcus.

Most European authors adopt the technic of Jausion, Diot and Vourexakis ("Chemio-teraphie intraveuneuse de la blennorragie par le chlorhydrate de diamino-methyl-acridine (Gonacrine)," *Acad. de Sc.,* 93 : 618, 1925). This substance, the chlormethylate of acridin, is powerful in action and potent in effects. The technic is thus described: "We used solutions in double distilled water of varying strength, *e.g.,* 1 : 200, 1 : 100, and 1 : 50. First we administered from 5 to 20 c.c. of the 1 : 200 solution, then less volume of higher concentrations."

According to Clara and Lebeuf (*Injections intra-veineuses de chlorhydrate de diamino-methyl-acridine*) the technic of Jausion is the best. First, 5 c.c. of the patient's blood is withdrawn into a syringe and mixed with the solution of gonacrine, in this case, 5 c.c. of a 2 per cent solution. Inject very gently and slowly.

Similarly, the methylate of acridin was used by Brandan (*Semana méd.,* 1926, 33 : 1921). He injected every two days 5 c.c. of a 2 per cent solution. These injections, according to Tissot (*Bull. et mém. de la Soc. de Méd. de Paris,* March 19, 1926), are very powerful in acute and chronic gonorrhea, and in gonorrheal arthritis.

The proper field of this remedy seems to be in acute and chronic gonorrheas and their complications.

Intravenous injections of *sodium iodid* are entitled to some consideration in the treatment of epididymitis. The question here seems to be one concerning the form in which they are to be administered; while some writers advise the use of simple solutions, others highly commend the drug in colloidal form.

There is also a method which was first brought out in Germany by Sirola, and still more explicitly explained in the Russian medical journal (*Wratschbejnce Djelo,* 1925, No. 5). It consists in the intravenous

injection of urotropin. It is an abortive method, the disease, it is said, lasting ten to fourteen days. Technic: Permanganate is used for urethral injections, and in the evening the patient receives an intravenous injection of 5 c.c. of a sterile solution of urotropin of 40 per cent strength.

Very excellent results in abortive treatment with urotropin are also reported by Halasz (*Dermat. Wchnschr.*, Leipz. u. Hamb., 1926, Vol. 82).

Mercurochrome, 1 per cent, in 50 per cent glucose, 10 c.c., gradually increased to 20 c.c., intravenously, is advised in conjunction with local injections by Redewill, Potter and Garrison (*Am. J. Urol.*, N. Y., 1926, Vol. 16), and good results claimed for it. The author again wishes to make it positive that his experience does not coincide with the above reports and, although there is usually little reaction following 1 per cent mercurochrome in 50 per cent glucose, intravenously, in some cases it may be very marked, contrary to the claims of Redewill, Potter and Garrison.

The Vaccine Treatment.—Thomson, of London, advocates the use of vaccines in the treatment of gonorrhea and claims great benefit from them. He has made a vaccine from which he states the endotoxins of the gonococcus have been removed and hence very large doses can be given. It is with this vaccine, he says, that he obtained his results.

The author has had no experience with Thomson's vaccine, but with the vaccines made in America he has had a large experience and except in the complications, such as prostatitis, epididymitis, arthritis, etc., he has seen no beneficial effect following the use of vaccines in either acute or chronic gonorrhea, and even in cases showing apparent improvement their benefit is doubtful.

As used in the complications of gonorrhea, the author feels that results with vaccines are more likely to follow when they are given in small doses, gradually increased every four days. Our method consists in the administration of 0.25 c.c. (50,000,000 dead gonococci) and if no reaction is produced, the next dose is given in four days and increased by 0.2 to 0.4 c.c. When a reaction occurs, as manifested by malaise, anorexia, fever, chilly sensation or rigor, the next dose should be the same as the one that gave the reaction and increased only if the patient has no symptoms following its administration. We believe the uncertainty of the effect of vaccines is due to something as yet not understood, *e.g.*, opsonins, antibodies, leukocytosis, agglutination, and when some research worker can determine the difference in the blood-picture in the cases that are benefited and those that are not, vaccine therapy may then prove as satisfactory as diphtheria antitoxin.

Diathermic Treatment.—The demonstration of the effects of diathermy in gonorrhea by Roucayrol before the French Academy, March, 1926, has at least given a scientific perception of the value of this method. Very convincing evidence was afforded that diathermy, if applied with his technic, brought about the disappearance of the parasitic flora found in the course of genital infections. The idea, first held, that heat alone was the active agent has altered; it was proved that not only the gonococcus was killed but other organisms more resistant to heat. An exhaustive study of the exudates led to the following conclusion which appears to be fundamental:

Diathermy has the power to liberate the toxin of the gonococcus. This toxin (and not heat or the microbe itself) increases the natural defenses of the body, causing a vigorous phagocytosis, which absorbs and brings to the surface detoxicated bacteria.

In chronic gonorrhea, this action of diathermy allows us to find gonococci whose existence could not otherwise be discovered.

In reinfections, the same cycle, *i.e.,* of cure by phagocytosis, recommences.

"Without doubt," write Buschke and Langer (*Lehrbuch der Gonorrhœ,* 1926, p. 145), "treatment by diathermy is the most exact auxiliary method by which we can employ heat in curing gonorrhea."

It would be unwise to rush to conclusions, but certainly the work done by Corbus and other Americans is strong evidence of the efficiency of diathermy. British writers, Thomson, Lees, Corner, are not so enthusiastic. In Europe, on the other hand, opinions are generally favorable.

By almost universal consent diathermy is useful in *epididymitis.* In a special treatise on the whole subject by Nagelschmidt and Kowarschik, the strength of current advised is as high as 0.3 to 0.6 ampere, and the temperature in the urethra is almost always increased to 45°C. The cases described leave the impression that the effects—resorption of the infiltrate and destruction of the gonococcus—are not exaggerated.

Some French authors (*Évolut. méd.-chir.,* Dec., 1925) have described a process of diathermy by radiations of insoluble radium salts. It is possible that, if only the insoluble salts are used, the emanations might produce healing effects, but radium should not be employed by anyone who cannot use the electroscope and calculate the number of Maché units given.

The author wishes to state that what he has written about diathermy in the treatment of gonorrhea is quoted from the literature, and in no sense represents his views upon the subject. Results have not been satisfactory.

CHAPTER V

URETHROSCOPY

GENERAL CONSIDERATIONS

By urethroscopy is meant the art of inspecting the urethra by means of electrically lighted metal tubes called urethroscopes or endoscopes. These tubes are of two kinds: Those which are simple, straight or slightly curved tubes, open at both ends, with an external electric light reflected to the distal extremity or with the light placed near the distal extremity, being attached on the end of a shaft that lies in a groove on the under surface of the instrument.

Another type of instrument is made with a curved tip having an opening or window on the convexity of the curve, for use in the posterior urethra. Either instrument, however, can be used in both the anterior or posterior urethra.

The second kind is a straight tube, or one slightly curved at the distal end. It is closed at the proximal end by an eyepiece and fitted with a lens system and a light at its distal extremity. It is also equipped with a water or air dilating device designed to keep the urethra distended during the examination.

Much important information can be obtained by careful inspection of the urethra and the urethroscope is often a valuable aid in the treatment of gonorrhea, but we must not let our enthusiasm over instrumentation get the better of our judgment, for much harm and serious injury may result from rough, careless or injudicious examination or treatment.

The instruments of the first type are the Swinburne, the Young, the Braasch and the Cameron; those of the second type are the McCarthy, the Brown-Buerger and the Greenberg.

ANTERIOR URETHROSCOPY

Preparation of the Patient.—Be careful in the first place to have the patient pass water (except in those cases where it is necessary to view the unaltered mucous surface) and disinfect the meatus, urethra and

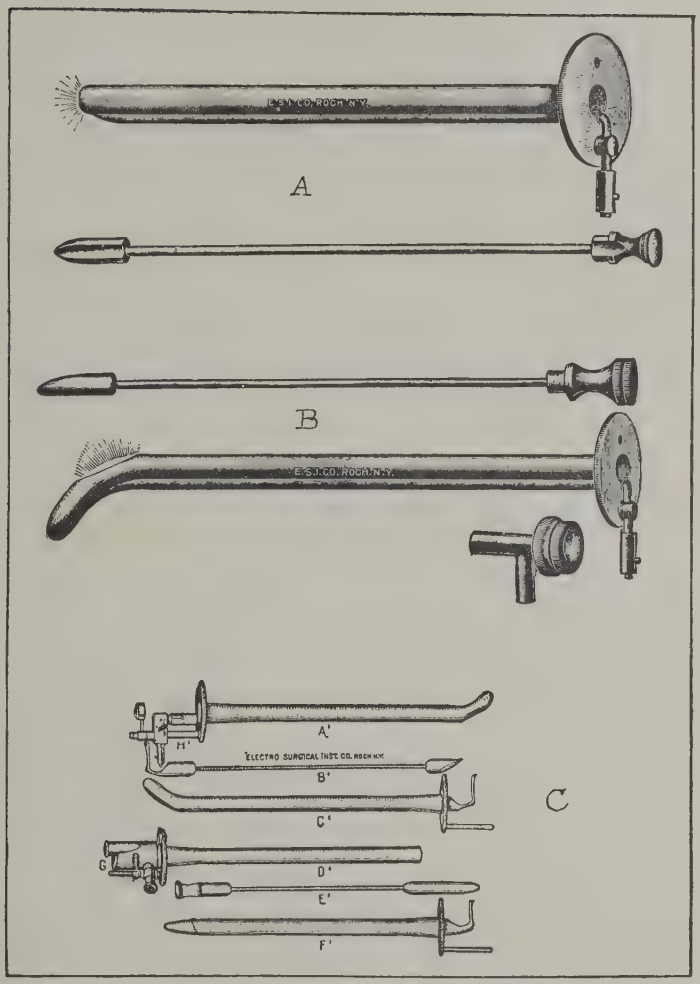

FIG. 9.—URETHROSCOPES, ELECTRICALLY LIGHTED.

A. Koch's: Sizes 18 to 33 French, 8, 12 or 15 cm. in length.

B. Swinburne's, posterior, with obturator and light carrier: Sizes 22, 24, and 26 French, 16 cm. in length.

C. Young's: *D'*, *E'*, *F'*, straight, sizes 26 and 28 French, plated or silver. *A'*, *B'*, *C'*, beaked, sizes 26 and 28 French, plated or silver. *H'*, light attachment.

posterior urethra even to the bladder. The absolute necessity of this urethrovesical lavage is insisted on (see Le Fur, Thomson, Luys, Lees, Wolbarst, etc.), particularly in cases of chronic urethritis, prostatitis or vesiculitis. The washing out of the urethra facilitates the use of the instrument and does much to avoid spasm. The manipulation of the instrument should be most cautious and gentle. An anesthetic should be employed; some prefer novocain, some alypin or butyn, or the less trustworthy stovain. The proportion of anesthetic used is of importance, but a 1 to 2 per cent solution of alypin is very efficacious.

Procedure.—Make a gentle and very careful preliminary exploration by bougie à boules, which will show the number, place, and degree of strictures.

Of the simple tubes, I prefer the Swinburne, and of the cystourethroscopes, either the McCarthy or Brown-Buerger. All are excellent instruments, but the preference is usually due to one's training or opportunity to develop technical skill by practice in a clinic or with an instructor who uses a certain type of instrument. I do not care for air dilating instruments and, in fact, think they are dangerous, as I believe there is the possibility of air embolus. I have seen two cases in whom there was the escape of air into the tissues of the penis and scrotum following the use of an air dilating urethroscope. The use of the urethroscope is an art that must be perfected by instruction and practice. In examining the anterior urethra one may employ the straight open tube or the curved posterior urethroscope of Swinburne, Young, Braasch or Cameron. The posterior instrument, however, will not demonstrate strictures or infiltrations as accurately as the straight tube, especially to the beginner.

After cleansing the penis and anesthetizing the urethra with alypin 2 per cent, the straight urethroscope is lubricated and introduced into the urethra as far as the anterior layer of the triangular ligament, and the obturator removed. The urethra will appear as though one were looking into a hollow cone with radiating longitudinal folds with red streaks between them. In the normal urethra the color of the mucosa is a pale, yellowish-pink. As the urethroscope is withdrawn the soft, pliable urethra continues to collapse behind the tip of the instrument constantly maintaining the cone-shaped cavity. The crypts of Morgagni can be seen and also the lacuna magna on the roof just posterior to the fossa navicularis. The normal glands of Littré cannot be seen. The walls of the fossa navicularis are paler and more rigid than the rest of the urethra and do not collapse as the instrument is withdrawn. When there is inflamma-

tion of the anterior urethra (the urethroscope should never be used in an acutely inflamed urethra), the picture is different. We only see the subacute and chronic cases.

In subacute gonorrhea the mucosa is swollen and reddened and often the inflamed follicles can be seen as pinholes in the roof of the urethra and sometimes surrounded by a bright red ring with pus or mucus exuding from their mouths. Soft infiltrations appear as thickened bulging areas of granulation tissue. In the chronic cases the picture is less acute and hard infiltrations appear as indurated, whitened scars along the canal and the urethra does not collapse behind the tip of the instrument but remains open and may be irregular and distorted, with the lumen either concentric or excentric.

POSTERIOR URETHROSCOPY

The patient should be placed on a cystoscopic table in a position for a cystoscopic examination, the instrument introduced, the water allowed to flow and the light turned on. The internal meatus is then carefully inspected. It normally appears as a circular ring with only slight puckering of the mucosa, which is of a moderately red color. There is no bleeding. The tube is gradually withdrawn and the prostatic urethra comes into view. Here the mucosa is normally a pale pink color, the walls are rounded and smooth and on the floor about ½ inch in front of the internal meatus the verumontanum comes into view. It is small, pale pink in color and of a rounded conical shape and projects about 0.5 centimeter above the urethral floor. The opening of the utricle is usually in the center near its apex on the anterior surface; and on either side of it the openings of the ejaculatory ducts may sometimes be seen. On each side of the verumontanum is a groove in which are the openings of the prostatic ducts. These, however, are too small to be seen.

As the instrument is withdrawn, it passes on into the membranous urethra which is similar to the penile urethra already described. When this is pathological, one may see cysts, ulcerations, granulations, villosities or papillomata. The prostatic urethra may appear red and the verumontanum swollen, clubbed, bifurcated or truncated, and there may be granulations or papillomata on it. Sometimes it is hypertrophied to three or four times its normal size. Papillomata, cysts and granulations may also be found on the walls or floor of the prostatic urethra, and the openings of the prostatic ducts may sometimes be seen. The utricle may appear wide

open with pus exuding from it and the slitlike apertures of the ejaculatory ducts may sometimes be clearly visible.

In the membranous urethra we find the reddened mucosa, the openings of any inflamed follicles and soft and hard infiltrations, the latter being thought to occur more frequently in this location than anywhere else. In the anterior urethra may be seen the inflamed mucosa, the infected follicles and crypts of Morgagni and the lacuna magna, from one or all of which pus may be seen escaping.

TREATMENT THROUGH THE URETHROSCOPE

Except for fulguration and diagnosis we may employ the open posterior urethroscope of Swinburne. For making a diagnosis and locating lesions, however, the author prefers the water dilating instrument and, therefore, he uses it first and if he wishes to make applications, he uses the Swinburne posterior urethroscope.

When we find granulations, papillomata, cysts or a hypertrophied verumontanum, no form of treatment is comparable to fulguration. This can be easily applied by means of a piece of fulguration wire or the Bugbee electrode through the McCarthy cysto-urethroscope. The soft, spongy, easily bleeding verumontanum may be touched with 20 per cent silver nitrate (Ballenger and Elder use 50 per cent) or carbolic acid applied on a cotton swab on the end of an applicator through the Swinburne posterior urethroscope, and the utricle injected with 20 per cent silver nitrate through the Livermore follicular needle. In the anterior urethra, papillomata may be fulgurated or touched with nitric acid, followed by sodium bicarbonate, and follicles may be injected with 20 per cent silver nitrate through the Livermore follicular needle. Ulcers and granulations may be touched with 20 per cent silver nitrate or carbolic acid applied with a cotton swab on an applicator.

Strictures should be treated by dilatation. Diathermy, by means of special electrodes, has also been employed, but has not proved very satisfactory.

CHAPTER VI

COMPLICATIONS OF ACUTE ANTERIOR URETHRITIS

BALANITIS

Balanitis is an inflammation of the mucous membrane of the glans penis. It may be acute or chronic. When the mucous membrane lining of the prepuce is also involved—and this is always the case except in patients who have been circumcised—it is called balanoposthitis.

The cause of balanitis is uncleanliness and a tight, or long and redundant, foreskin. The accumulation of smegma, pus, gonococci and other organisms under the foreskin, and the failure of the patient to keep it clean, gives rise to infection and inflammation of the opposing surfaces.

Symptoms.—The mucous membrane of the glans becomes red, swollen and is bathed in a purulent discharge, often offensive in odor, and areas of excoriation may occur. If the patient has not previously been circumcised, the prepuce is swollen, red and edematous and foul pus exudates from its orifice or flows out when attempts are made to retract it.

Diagnosis.—The diagnosis is made by the presence of the inflammation and swelling, the purulent discharge and by finding the gonococcus in a smear of the discharge.

Prognosis.—The prognosis is good and usually a cure is easily and quickly brought about by cleanliness and by the prevention of a further accumulation of the discharge under the foreskin.

Treatment.—The foreskin should be retracted and the glans and prepuce thoroughly cleansed with weak mercuric bichlorid or boric acid solution. The inflamed surfaces should then be kept separated by a layer of gauze, which should be saturated at frequent intervals with mercurochrome solution 1 or 2 per cent, acriflavin 1 : 4000, or Ochsner's solution. A good dressing consists in making a hole in the center of a piece of gauze 4 inches square, the so-called butterfly dressing which is described in Figures 3 and 4. The glans penis is passed through the hole until the edge of the opening in the gauze is in the coronal groove. The foreskin is then brought forward over the glans, thus putting a layer of gauze between the glans and the prepuce. This should be renewed three or four times a day and kept saturated with one of the above solutions.

In the more severe cases, the penis can be soaked in a bowl of hot antiseptic solution for fifteen minutes and dressed with lead and opium lotion or aluminum acetate solution, and an ice-bag applied. Circumcision should be done when the inflammation and swelling have entirely subsided and the urethral discharge has ceased.

PHIMOSIS

Phimosis is a condition of the prepuce which renders its retraction behind the glans penis impossible.

It may be congenital or acquired. The acquired form, as a complication of gonorrhea, is, of course, due to the gonococcus. But uncleanliness and any of the pyogenic bacteria that give rise to balanoposthitis may cause it, and a tight or redundant foreskin are predisposing factors.

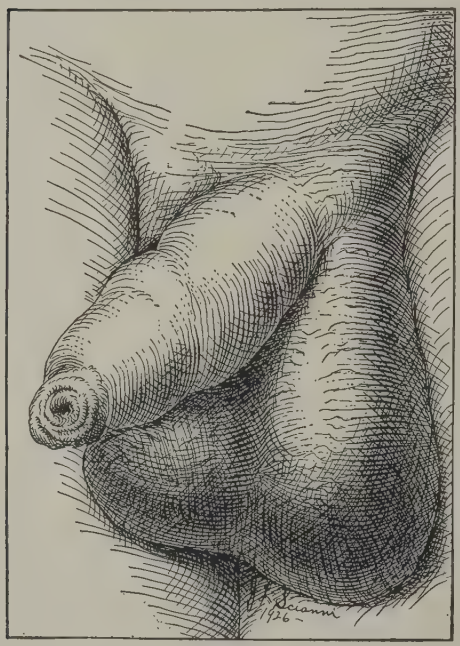

Fig. 10.—Phimosis.

Symptoms.—On account of the inflammation and swelling of the foreskin the patient is unable to retract the prepuce over the glans penis and behind the corona glandis. The foreskin is thickened, reddened and edematous and its orifice is so contracted that the glans cannot be exposed at all, or only partially so, and a purulent discharge escapes from the outlet.

Diagnosis.—The diagnosis is made by the appearance of the parts, by the inability to retract the foreskin over the glans penis and by the discharge from beneath the foreskin in which, in the gonococcic type, gonococci can be found.

Treatment.—The treatment consists chiefly in cleanliness, soaking the penis in hot antiseptic solutions, boric acid, mercuric bichlorid, etc., appli-

cations of lead and opium lotion or aluminum acetate solution and an ice-bag to allay the inflammation. An injection may be made of potassium permanganate, 1: 5000, in the orifice of the foreskin. If, despite the above treatment, the condition remains unchanged or grows more severe, a dorsal, or better, a bilateral incision should be made in the foreskin, the prepuce everted and the parts thoroughly cleansed. The edges of the wounds should be sutured with catgut, bringing the cut edges of the mucous membrane and skin of the prepuce in apposition. It should be dressed with gauze saturated with mercurochrome solution, 2 per cent, or acriflavin, 1: 1000, and kept wet with the same. Dusting with iodoform and dressing with gauze saturated with Ochsner's solution is also very satisfactory, except for the odor.

FIG. 11.—PARAPHIMOSIS.

PARAPHIMOSIS

Paraphimosis is that condition in which the foreskin has been retracted over the glans penis and cannot be brought forward again. The narrowed preputial orifice being now caught behind the corona glandis, acts as a rubber band about the penis, impeding circulation and soon producing swelling and edema of the glans and foreskin and often deformity of the penis. The longer the condition persists the tighter the constriction. Should it continue, gangrene of the glans penis may occur. Fortunately, however, necrosis and gangrene usually begin in the constricting band, which sloughs and thus relieves the condition by severing the constriction.

The cause of paraphimosis is the gonococcus and balanoposthitis, especially when the patient has a tight foreskin. It is due to the patient retracting the foreskin behind the corona glandis and being in a swollen and painful condition, it cannot be brought forward again.

Symptoms.—The foreskin is seen to be retracted over the glans and caught in the coronal groove and the patient has been unable to bring it forward again. The penis is swollen, painful and deformed and sometimes gangrene of the glans penis occurs, but more often there is sloughing or gangrene of the constricting band.

Diagnosis.—The diagnosis is made by the appearance of the penis showing the foreskin caught behind the glans, and the edema, swelling and deformity of the glans, foreskin and penis.

Prognosis.—The prognosis is good if seen early and the constriction promptly relieved. In the late cases, gangrene of the glans penis or infection of the entire organ may occur, though sloughing of the constricting band usually occurs first.

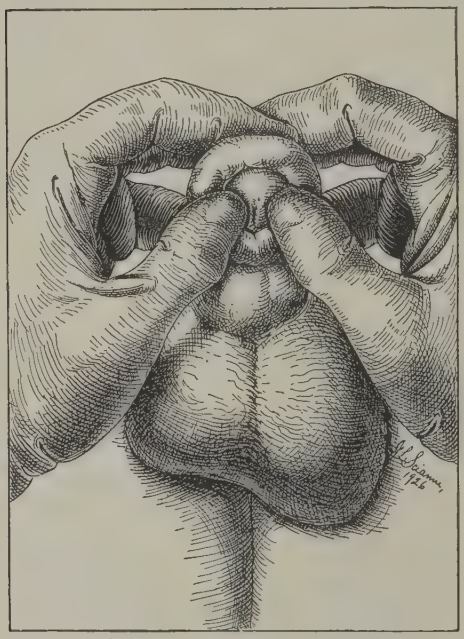

Fig. 12.—Reduction of Paraphimosis.

Treatment.—Attempts should be made at once to relieve the constriction by bringing the foreskin forward over the glans. This is best done by encircling the penis with the index and middle finger of each hand and with the thumbs making pressure on the glans while attempts are made to draw the foreskin foreward with the fingers. This succeeds in the majority of cases. When it fails, a grooved director should be passed under the constricting band on the dorsum of the penis and the band incised. It should be cut longitudinally to the penis and the cut edges sutured transversely with catgut. The foreskin can then be brought forward easily over the glans. The incision should then be dressed with 1 or 2 per cent mercurochrome, lead and opium, or aluminum acetate solution and an ice-bag should be applied to allay the inflammation. Later, Ochsner's solution, or mercurochrome 2 per cent may be applied to the wound.

PERIURETHRAL ABSCESS

Periurethral abscess, as its name implies, is an abscess around the urethra. It is located on the under surface or sides of the penis and may occur in any portion of the organ from the frenum to the penoscrotal junction. There may be one or more abscesses. When in the region of the frenum it is frequently bilateral, the so-called frenum abscess or parafrenitis.

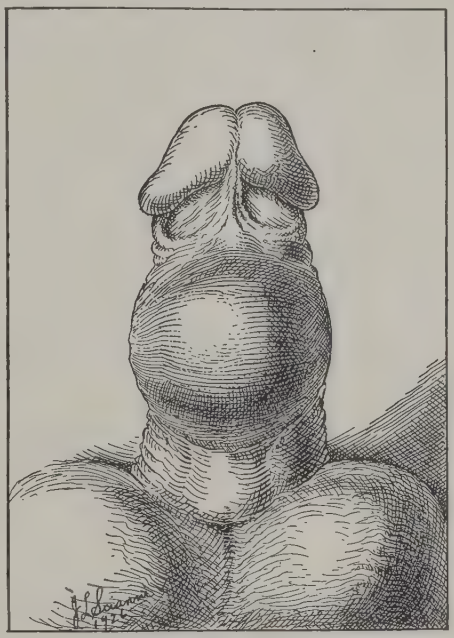

Fig. 13.—Periurethral Abscess.

It is due to infection of a gland of Littré, a crypt of Morgagni, or a frenal gland by the gonococcus, when occurring as a complication of gonorrhea, but may also be the result of infection with other pyogenic bacteria as well. So long as the follicle drains into the urethra the patient suffers no appreciable inconvenience other than a continuation of his urethritis, but when the mouth of the follicle becomes occluded and drainage is prevented the development of an abscess begins, for the infection then burrows out into the corpus spongiosum.

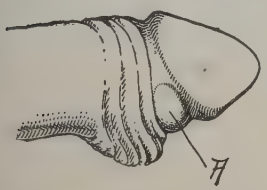

Fig. 14.—Periurethral Abscess in the Fossa of the Frenum—Parafrenitis. (Guiteras)

Symptoms.—The patient first notices an indurated, slightly tender area on the inferior or lateral aspect of the penis. It feels hard, round and shotlike and may or may not be painful on pressure. This usually rapidly progresses to abscess formation, becoming swollen, painful, soft and fluctuating and the skin may appear red and glistening over it. Sometimes there is no change in the skin. In some cases, however, abscess formation progresses very slowly. When very large, it may encroach upon the lumen of the

urethra and cause more or less obstruction to urination and difficulty in voiding.

Diagnosis.—The diagnosis is easily made by the history of gonorrhea and the characteristic shotlike feel on the inferior or lateral aspect of the penis, followed later by swelling, fluctuation, tenderness and sometimes redness of the skin.

Prognosis.—The prognosis is good if properly treated. In some cases the mouth of a gland of Littré may reopen, discharge its contents into the urethra and resolution result, or, after pus has formed, it may rupture into the urethra and heal spontaneously, but more frequently a large abscess develops and must be relieved by incision through the skin and drainage.

Treatment.—In the early, shotlike stage, lead and opium lotion, aluminum acetate solution, 25 per cent ichthyol ointment, and hot or cold applications and treatment of the follicle through the urethroscope, may result in a cure. If, however, an abscess develops, surgery is the only remedy: An incision through the skin, evacuation of the pus and packing the abscess cavity with gauze saturated with mercurochrome 2 per cent or acriflavin 1:1000. It should be dressed daily and repacked in order to insure healing from the bottom. After the wound has healed, and in those cases which have subsided without abscess formation, it is best to examine the urethral opening of the follicle through the urethroscope in order to be sure that all infection has cleared up. Do not incise a periurethral abscess *until fluctuation has been obtained.* A urinary fistula may result if this rule is not followed. When the abscess occurs in the glands about the frenum a urinary fistula may result even though it is not lanced until fluctuation is obtained. The resulting fistula is difficult to heal and may require excision, but the author has seen healing follow fulguration or the injection of the fistula with 2 per cent acriflavin or 10 per cent mercurochrome.

In some cases of periurethral abscess, however, although no urinary fistula develops, a sinus remains and continues to discharge pus. It may heal for a time, then open and discharge again. When this occurs, if the sinus will not heal after injecting 2 per cent acriflavin, 10 per cent mercurochrome, or carbolic acid through a blunt needle, it must be excised, for it will be a constant source of annoyance and reinfect the patient at intervals as long as it remains. To excise it an incision should be made about the opening in the skin, and the sinus dissected free, down to the urethra. It should then be ligated with chromic catgut at its entrance into the urethra and excised; the stump cauterized with carbolic acid,

and alcohol and iodin applied. The skin should then be closed over the stump with silkworm-gut sutures and a small rubber tissue drain left in for twenty-four hours.

PARA-URETHRAL FOLLICULITIS

There are two small glands or follicles situated one on each side at the lower angle of the lips of the external meatus, which often become infected with gonococci. They are called para-urethral follicles. If allowed to persist they often lead to reinfection of the patient or infection of any woman with whom he may have intercourse. In some cases this infection may burrow deeper and deeper, finally opening into the urethra in the fossa navicularis, causing a urinary fistula from which pus exudes at all times. It, too, may heal for a time, then rupture and discharge pus again. Urine escapes through it when the patient voids.

This condition is due to the infection of the para-urethral follicles or glands by the gonococcus during an attack of acute anterior gonorrhea.

Symptoms.—There may be some swelling, redness, edema and tenderness of the meatus and when gently compressed, pus may be seen to exude from one or both follicles. In some cases the only symptom is pus escaping from the follicle and this may not be noticed unless the meatus is subjected to pressure.

Diagnosis.—The diagnosis is made by noting the inflammation of the meatus and by expressing a drop of pus from the mouth of the follicles.

Prognosis.—The prognosis is good if the follicle is completely excised or destroyed, otherwise it may be an unending source of infection.

Treatment.—The best means of cure is to incise the follicle and obliterate it by packing it with gauze saturated with mercurochrome 2 per cent, or acriflavin 1:1000, and allowing it to heal from the bottom. A fine wire is passed to the tip of the follicle and the entire tract laid open, and treated as an abscess in any other part of the body. These foci of infection may also be obliterated by fulguration with the monopolar current. The fulguration wire is passed to the bottom of the follicle and the current turned on until the follicle is completely destroyed. Should this fail, incision and packing should be resorted to. Unless the entire tract is obliterated, the infection will not be eradicated.

COWPERITIS

Cowperitis is an inflammation of Cowper's glands. If not arrested, it may progress to abscess formation. Although Cowper's glands are situated between the anterior and posterior layer of the triangular ligament and hence lie under the posterior urethra, nevertheless, their ducts puncture the anterior layer of the triangular ligament and open into the anterior urethra. It is for this reason that it is a complication of acute anterior gonorrhea, although it may not occur until after the posterior urethra has become involved.

Cowper's glands open into the floor of the bulb, and are readily infected in gonorrhea. The left is rather more frequently infected. Fuller says he has never seen a bilateral case. Cowperitis is a rather rare condition and does not usually occur before the third week of an acute gonorrhea. Schischow and Smirnow state that they found cowperitis in 12.2 per cent of two hundred cases of gonorrhea and that it is one of the main causes of its persistence.

Symptoms.—There is a sense of pain and heaviness in the perineum, sometimes of a sharp knifelike character. It usually radiates to the affected side but sometimes to the scrotum, anus, or inner side of the thighs. Palpation is quite painful, and, in some cases, excruciating. As the gland is more or less surrounded by the compressor urethræ muscle, the act of urination is extremely painful and sometimes difficult or even impossible, as the urethra may be partially or completely obstructed by the pressure of the abscess encroaching upon its lumen. As the abscess increases in size, a swelling is noticed in the perineum on one side of the median raphé, between the base of the penis and the anus. With the index finger in the rectum and the thumb on the perineum, the induration and sometimes fluctuation of the abscess may be made out.

There is no redness of the skin of the perineum until the infection has extended beyond the limits of the gland. The temperature is usually elevated one or two degrees when the inflammation begins, but after an abscess develops there will be chills, high fever, leukocytosis and other evidences of pus formation.

Diagnosis.—The diagnosis is made by the history, by the symptoms and by the bidigital examination. By means of the latter, the indurated nodule on one side of the median raphé of the perineum or the fluctuation of an abscess can be palpated.

Prognosis.—The prognosis is good if seen early and before pus has formed, as the inflammation usually subsides under rest and antiphlogistic measures. If an abscess develops, it must be incised and drained. A certain proportion of cases, however, become chronic and a cure is difficult.

Treatment.—The patient should be put to bed and all urethral instrumentation discontinued. Alkalis should be given by mouth and the patient instructed to drink large quantities of water. He should take hot sitz-baths and apply hot or cold applications to the perineum. Lead and opium lotion with ice compresses or 50 per cent ichthyol ointment are sometimes beneficial. Diathermy may help in allaying the inflammation.

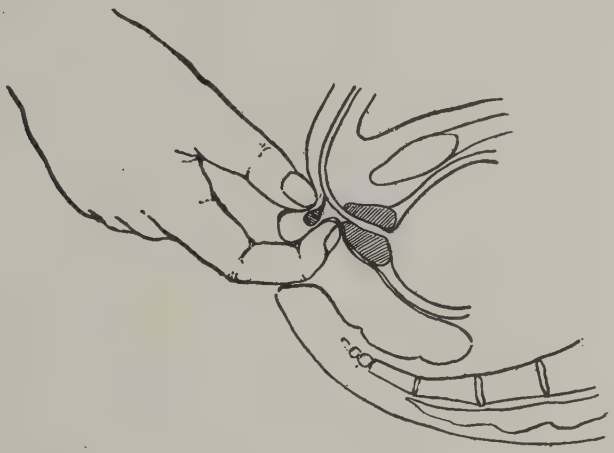

Fig. 15.—Bidigital Manner of Examining Cowper's Gland. (Guiteras)

Mixed gonococcic vaccine has been recommended and may prove of benefit. Gentle massage of the gland followed by urethral irrigation has been advised, but in the author's judgment, this course is more likely to aggravate the inflammation than to check it. It is rather painful and as the ducts are often obstructed by swelling or inflammatory products, any manipulation tends to increase the liability to abscess formation. Should the acute symptoms subside under rest and antiphlogistic measures, then the injection of the duct by means of the Livermore follicular needle, through the urethroscope, may be done with benefit and final relief of symptoms, with the prevention of chronic cowperitis.

Should the inflammation continue to abscess formation, incision and drainage are imperative. The patient is placed on his back with the thighs flexed on the abdomen and the perineum exposed and all antiseptic pre-

cautions observed. It is unwise to pass a sound unless there is posterior involvement as infection will be carried to the posterior urethra. Special caution should, therefore, be used to avoid injury to the urethra. Should it occur, if the wound is carefully packed daily with gauze as described below it is not serious and will heal usually without fistula formation.

An oblique incision is made in the skin over the abscess, the pus evacuated and a cigarette-drain inserted and sutured to the skin with silkworm gut. A small gauze wick, saturated with acriflavin 1 : 1000 or mercuro-

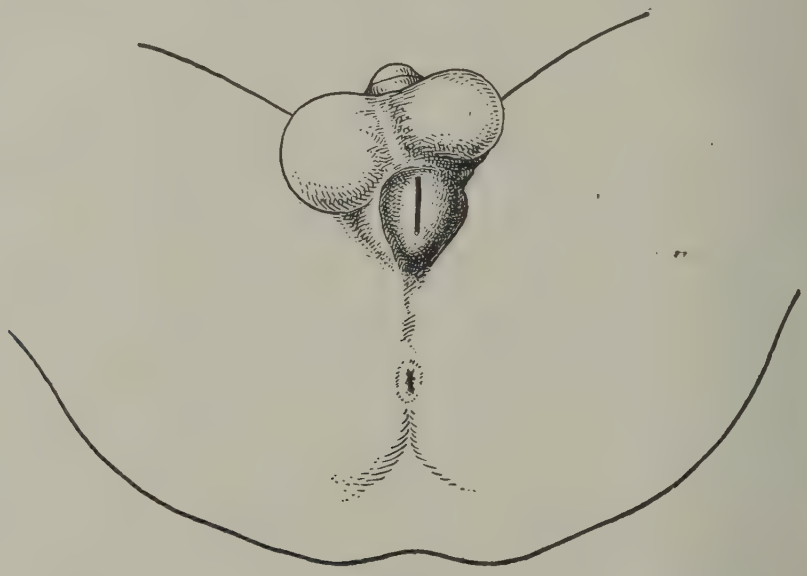

Fig. 16.—An Abscess of Cowper's Gland Pointing into the Perineum. It should be incised. (Guiteras)

chrome 2 per cent, should be packed into the abscess cavity by the side of the cigarette drain. Daily dressings should be done, and the abscess cavity packed with mercurochrome gauze to ensure healing from the bottom. In the great majority of cases the wound heals promptly with no after effects. Sometimes, however (and in nearly all cases that rupture spontaneously), a fistula results. Catheterization of the duct through the urethroscope and injection of the fistula with antiseptics, *e.g.,* acriflavin 2 per cent, mercurochrome 10 per cent or enzymol may effect a cure, but in most cases excision of the secreting fragments of the gland must be done before the fistulous tract will heal.

Chronic Form.—When an acute cowperitis subsides without abscess formation, it is often followed by a low-grade chronic inflammation. Pasteur says, "Many an intractable chronic gonorrheal arthritis has its focus of reinfection in a chronic cowperitis which has passed unperceived and for which a systematic search should always be made."

There are few symptoms of chronic cowperitis and only two that point directly to it. These are seeing the gaping and discharging opening of the duct through the urethroscope and palpating the nodular enlargement of the gland on bidigital examination.

Treatment consists in the injection of the duct with silver nitrate 20 per cent through the urethroscope by means of the Livermore follicular needle. The gland should also be gently massaged between the index finger in the rectum and the thumb on the perineum to the right or left of the bulbous urethra, depending upon the gland involved. Hot or cold applications or compresses saturated with lead and opium lotion, aluminum acetate solution or ichthyol ointment 50 per cent to the perineum should be tried. Potassium iodid by mouth or sodium iodid, 7½ to 15 grains (0.5 to 1 gram) intravenously, have been recommended. In some persistent cases excision of the gland may be necessary to effect a cure.

LYMPHANGITIS

This is an inflammation of the lymphatics of the penis caused by the gonococcus and other pyogenic bacteria.

Symptoms.—The penis becomes swollen and edematous and the skin marked by red streaks along the dorsum or sides of the penis, or both. These red streaks are tender and can be felt as indurated cords beneath the skin. They can frequently be traced to the inguinal lymph-nodes into which they empty.

In some cases suppuration occurs along the course of the lymphatics and when this happens, soft, red, fluctuating areas develop and the skin may appear smooth and glistening over them.

Diagnosis.—The diagnosis is easily made by the history and the symptoms, especially by seeing the red streaks, while by palpation, the tender, indurated cords can be felt.

Prognosis.—The prognosis is good for the symptoms usually subside promptly under treatment and rarely progress to abscess formation.

Treatment.—The treatment consists in putting the patient to bed and applying hot or cold fomentations. Lead and opium lotion, aluminum ace-

tate solution or ichthyol ointment 25 per cent may also be applied. The urethra should be irrigated frequently with hot, 105° F. (43.3° C.), potassium permanganate solution, or 1: 10,000 acriflavin, followed by the usual injections for gonorrhea, for it is due to the urethritis and the quicker this is controlled the better the chance of curing the lymphangitis.

INGUINAL ADENITIS

This is an inflammation of the inguinal lymph-nodes. One or more may be involved and it may be unilateral, or bilateral.

The cause is the same as that giving rise to the original infection. The gonococcus and other pyogenic bacteria as well, especially the staphylococcus and colon bacillus, may be the offending organisms.

Symptoms.—The inguinal lymph-nodes become hard, tender, swollen and painful and later the skin over them may become reddened and is adherent to them. The patient complains of pain on motion and when standing. If lying down he is more comfortable if the thigh is slightly flexed. There may be malaise and slight fever and if the inflammation progresses to abscess formation, there may be rigors, high fever, sweats, and a leukocytosis.

Diagnosis.—The diagnosis is made from the history and symptoms and by seeing and palpating the enlarged, tender lymph-nodes in the groin.

Prognosis.—The prognosis is good as the adenitis usually subsides under proper treatment, but frequently progresses to abscess formation. When this occurs some abscesses heal kindly while others are lasting and often difficult to cure and a discharging sinus may persist for months.

Treatment.—If seen early, before suppuration has occurred, rest in bed and hot or cold applications may promote resolution. Lead and opium lotion, aluminum acetate solution, ichthyol ointment 50 per cent, or compound iodin ointment may be used and a tight flannel spica bandage applied. The administration of mixed gonococcic vaccine every four days, beginning with 0.25 c.c. (50,000,000 dead gonococci) and increasing the dose 0.25 c.c. each time until some reaction occurs, may also prove of value. Diathermy, too, according to Corbus and O'Conor, gives relief of pain and discomfort and promotes resolution or softening. If suppuration results, it is called a bubo, either circumscribed or diffuse. Hypodermics of aolan, lactogen or milk have also been recommended. The author has seen good results follow the intravenous use of 1 per cent tartar emetic, 2 to 5 c.c. every other day.

BUBO

Symptoms.—If circumscribed, only one or two nodes may break down and this gives rise to a soft, red, swollen, fluctuating and tender area. The patient may have fever and suffer with malaise and anorexia. He may even have chills, fever and sweats and a leukocytosis. It is a rare complication in office workers, but occurs frequently in those who do heavy manual labor.

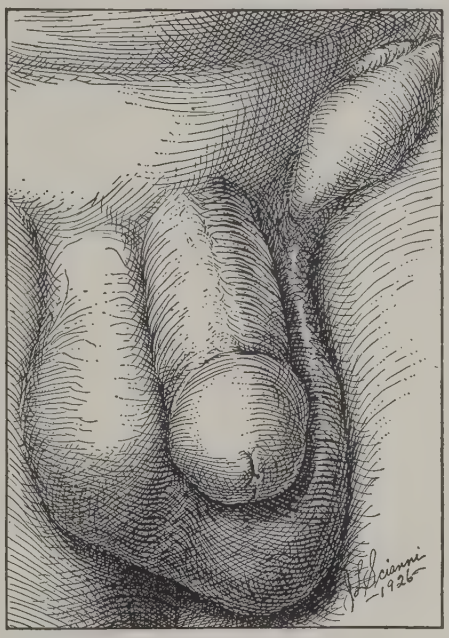

Fig. 17.—Inguinal Adenitis. Bubo.

Prognosis.—The prognosis is usually good, although some cases are difficult to cure and may require complete excision of the infected nodes.

Treatment.—The treatment depends upon the character of the bubo. In the circumscribed variety, the Hayden Helm operation is particularly serviceable. This consists in making a small incision in the most fluctuating part of the bubo, evacuating the pus and thoroughly cleansing the abscess cavity with some antiseptic solution; acriflavin 1:1000, or mercurochrome 1 to 2 per cent, are good. We now inject through the incision by means of a small glass syringe (a 5 c.c. Luer is very good for this purpose) a small amount of a 10 per cent iodoform ointment made up in petrolatum with about 10 per cent white wax added to make it stiff. The amount used depends upon the size of the cavity which should be comfortably filled but should not feel tight. While the ointment is being injected, an assistant should massage the skin over the abscess cavity so as to force the ointment into all crevices of the cavity. When it is filled, a piece of antiseptic gauze wrapped about a piece of ice is held over the incision so as to congeal the ointment at this point, causing it to act as a plug and thus preventing its escape from the cavity. A spica bandage is then applied and the patient is put to bed. The wound is dressed daily.

At the end of twenty-four hours, if the wound seems clean and the ointment is exuding from the abscess cavity with only a small amount of mucopurulent material, we can squeeze out about one-half of the ointment and reapply the bandage. This is repeated each day, and, as a rule, all the ointment is out and the wound healed in a week or ten days. If, however, at the first dressing, there is a large amount of pus exuding with the ointment, it is best to again cleanse the cavity thoroughly and reinject it with the ointment. If suppuration continues despite the second injection, the wound should be laid open and the broken down remains of the lymph-nodes removed with the fingers or curet and the wound packed with gauze saturated with 2 per cent mercurochrome or 1 : 1000 acriflavin. The skin should be closed to the gauze with silkworm-gut sutures.

If there are many suppurating areas, it is wisest to make a complete dissection of the inguinal region and remove all nodes that are involved. Any broken down remains should be carefully curetted. The wound should be packed as above and dressed daily, putting in fresh packing so as to insure complete healing from the bottom. Healing may require months and frequently a sinus is left which is quite stubborn. In such cases, packing with gauze saturated with enzymol is usually effective in promoting closure.

It happens, sometimes, following removal of the inguinal lymph-nodes and due, probably, to the cutting of so many lymph-channels and the oozing of the escaping lymph into the tissues, that marked edema and swelling of the thighs, scrotum and penis may occur. This is troublesome and may last for weeks, or even months. It is not serious, however, and will subside completely and without deleterious effects after so long a time.

CHAPTER VII

COMPLICATIONS OF ACUTE POSTERIOR URETHRITIS

PROSTATITIS

The multiple openings of the prostatic ducts on the floor of the prostatic urethra make infection of the prostate a foregone conclusion when the gonococcus has passed beyond the compressor urethræ muscle. Perhaps cases of posterior gonorrhea without involvement of the prostate do occur, but they are the exceptions that prove the rule. The congestion of the posterior urethra causes congestion of the adjacent structures and hence makes the prostate more susceptible to infection. It is a fact, too, that involvement of the prostate may be present without enlargement of the gland and without pain or other symptoms referable to it.

There are three varieties pathologically: (1) An acute catarrhal inflammation which, Lowsley and Kerwin state, is always present in acute posterior urethritis and which is usually caused by a direct migration of the gonococcus into the tubules; (2) follicular, which is characterized by the formation of small abscesses or pus pockets in the tubules, due to plugging of the ducts; and (3) parenchymatous. In this type there is a larger collection of pus in the tubules and an extension beyond them into the substance of the prostate. An increase beyond this state results in an abscess of the prostate. Clinically, these types cannot always be differentiated, although it may not be difficult to distinguish between the first and third types.

Histological preparations and many investigations of the secretion expressed from the prostate have established that the cause of acute and chronic prostatitis is the gonococcus; but it is also accepted that in many cases of prostatitis, particularly where no gonococci can be found in the expressed fluid, a mixed infection is present in which the chief agents are staphylococci, streptococci and the colon bacillus.

Acute Type.—*Symptoms.*—There may be few subjective or objective symptoms and often the only means of determining that the prostate is involved is by massaging it per rectum and expressing the contents of its

tubules and ducts into the urethra and on to the meatus where microscopical examination will reveal pus and gonococci. If no fluid is expressed the patient should void immediately in order that the urine may be examined for pus and gonococci.

In addition to the urethral discharge there may also be frequency of micturition, and in the acute cases there is a painful urgency of micturition; the patient, in the language of Buschke, being "able to void not more than a few drops with great suffering." There is suprapubic pain. On palpation per rectum the prostate seems enlarged in one or both lobes, and is very tender to the touch. There may be malaise, anorexia, chilly sensations and fever. The frequency and pain of urination increase until the patient may have to void every ten to thirty minutes, both day and night. The congestion and enlargement of the prostate and its encroachment upon the urethra may increase until complete retention occurs and catheterization becomes necessary to afford relief. The urethral discharge usually diminishes or subsides altogether. Defecation is often painful and there may be a sensation of obstruction to the passage of feces. On introducing the finger into the rectum, the prostate is felt to be much enlarged, tense and exquisitely tender.

The *diagnosis* is made by the history, the symptoms, finding gonococci on microscopical examination, and by the enlarged, tender prostate as felt by the examining finger in the rectum.

Prognosis.—The prognosis is good if the patient follows directions, but a proportion of cases progress to abscess formation despite anything that can be done.

Treatment.—The patient should be put to bed and a retention catheter placed in the bladder. The catheter affords relief from retention and by putting the bladder at rest allays the inflammation and swelling of the prostate. Although the retention catheter is painful at first and opiates must be given for relief, it is more grateful to the patient than the frequent dysuria and catheterization, and after twenty-four hours most patients have been rendered so comfortable they will not let it be removed. Intermittent catheterization done with the utmost care and gentleness and under aseptic precautions, after thoroughly anesthetizing the urethra with 1 per cent alypin or 2 per cent butyn, is advocated by some, but in the author's experience the retention catheter produces less trauma and makes the patient far more comfortable. Hot rectal irrigations of saline by means of the Kempt tube, applying heat by means of Eissner's, Wiener's or Artzberg's psychrophore, and hot sitz-baths are useful in allaying the pain and

reducing the size of the inflamed gland. Laxatives should also be given, and mixed gonococcic vaccine 0.25 c.c. (50,000,000 dead gonococci), given every four days, the dose being gradually increased each time until a reaction occurs (aching, chills or fever), may help. The therapeutic lamp to the perineum and diathermy to the prostate may be of service; intramuscular injections of 5 to 10 c.c. of milk, aolan or lactogen have sometimes been of value. Morphin or codein may be given to allay the pain and irritation due to the retention catheter as well as the pain incident to the prostatitis, while alkalis with tincture of belladonna and hyoscyamus are useful in relieving the frequency of urination, burning and tenesmus.

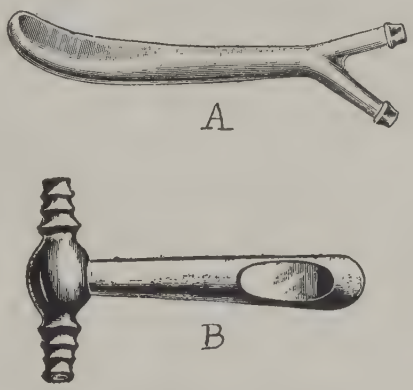

Fig. 18.—Prostatic Psychrophore.
A. Eissner's.
B. Wiener's.

The above measures will afford relief in a large percentage of cases, but the remainder will develop an abscess of the prostate, which must be opened and drained.

Chronic Form.—*Symptoms.*—There may be no symptoms except a slight urethral discharge and a vague uneasiness in the perineum or rectum or both. In others, however, there may be frequency, dysuria and dull pains in the perineum, rectum, testicles, thighs and back. The patient may be nervous and apprehensive and may have frequent nocturnal pollutions. There may also be increased or markedly diminished sexual desire and weak erections, or there may be premature ejaculations and, in some cases, complete absence of erections. In the latter types, the patient is melancholy and becomes the so-called sexual neurasthenic who is a nuisance to himself and to every one with whom he comes in contact. On rectal examination the prostate is usually enlarged and tender and the vesicles are thickened and surrounded by an inflammatory mass. In others, the prostate may be small and hard and only slightly tender. The fluid expressed on massage of the prostate contains pus, gonococci, epithelial cells and lecithin crystals. It may be thick, yellow and ropy, or thin, grayish-white and watery.

The *diagnosis* is made by the history, symptoms, the microscope, and by rectal examination.

The *prognosis* is good, but requires long-continued and careful treatment which taxes the patience of both doctor and patient.

Treatment.—The treatment consists in the use of hot rectal irrigations and massage of the prostate twice a week, followed by irrigations of silver nitrate, 1: 8000, and the passage of sounds cooled in ice water, or electrically heated, and hot urethral irrigations through the Guiteras tube. Diathermy, by means of a rectal electrode, may also help. Corbus and O'Conor say: "We believe that heat as applied by medical diathermy will destroy the gonococcus, and in gonorrheal prostatitis, prostatic abscess and seminal vesiculitis, its therapeutic possibilities are absolutely specific." Dilations of the urethra with the Kollmann dilator and touching the verumontanum with silver nitrate 20 per cent through the Swinburne posterior urethroscope, or fulgurating it through the Brown, Buerger, or McCarthy cystourethroscope are often efficacious in relieving pain and dysuria, diminishing nocturnal pollutions and premature ejaculations and restoring normal erections. Vaccines have little or no effect; but intramuscular injections of milk, lactogen or aolan have been recommended.

ABSCESS OF THE PROSTATE

If the acute inflammation does not subside, an abscess soon develops. It is usually circumscribed and limited to one lobe, though multiple abscesses may occur and involve the entire gland.

During the acute stage of prostatitis, one or more of the ducts draining the alveoli may become blocked, in which case an abscess forms in the prostatic tissues. Although abscess of the prostate occurs most frequently as a complication of posterior gonorrhea, it also occurs in men who never had this disease, due to infection with other pyogenic organisms.

Symptoms.—The symptoms of acute prostatitis are intensified. The pain becomes more severe and of a throbbing, boring character. The frequency and tenesmus become more marked and complete retention may occur. There are chills, fever and sweats and a leukocytosis with high polymorphonuclear percentage. The finger in the rectum causes such intense, agonizing pain that few patients have sufficient stamina to allow it. If it can be done, the prostate is found to be greatly enlarged, excruciatingly tender and if the abscess points towards the rectum, a soft, fluctuating area can be palpated.

Diagnosis.—The diagnosis is made by the history, rise of temperature, rectal examination, leukocytosis and other symptoms of pus formation.

Prognosis.—The prognosis is good if the abscess is opened and drained or ruptures spontaneously into the urethra or bladder.

Treatment.—It is a fact that many prostatic abscesses rupture spontaneously through the urethra or bladder, or do so during massage, or palpation per rectum, evacuate their contents and heal satisfactorily. However, as we seldom know in what direction the abscess will rupture, immediately after the diagnosis is made the abscess should be opened and drained. The author's method consists in placing the patient in the lithotomy position and passing a small sound into the bladder to prevent injury to the urethra. An incision is made in the median raphé through the skin only, then the skin is dissected one-half inch to the right or left of the midline, depending upon where the abscess is thought to be, and with one finger in the rectum as a guide, a sharp, pointed hemostat is plunged through the muscles of the perineum to the prostate, where it perforates the capsule and ruptures the abscess; the blades are then separated and withdrawn; a drainage tube is inserted into the abscess cavity and sutured to the skin of the perineum with one silkworm-gut suture. The tube is left in place for twenty-four hours, then shortened about one-half inch and gradually withdrawn each day until it is removed entirely on the fourth day (the abscess cavity having been irrigated daily through the tube with acriflavin, 1:1000) when a small gauze wick, saturated with mercurochrome 2 per cent or acriflavin, 1:1000, is inserted. This is repeated daily until the wound has healed completely from the bottom.

Some authorities recommend complete dissection of the perineum and exposure of the prostate as for a prostatectomy, but I see no reason to perform so extensive an operation when the above answers the same purpose and is equally effective. Some years ago Stevens recommended rupturing the abscess through the urethra by passing a sound to the prostatic urethra and forcing the tip of the sound into first one lateral lobe and then into the other. In his series, the immediate results were good, but it seems an unsurgical procedure to me and I feel sure the ultimate results must be cicatricial contracture of the prostatic urethra.

SEMINAL VESICULITIS OR SPERMATOCYSTITIS

Seminal vesiculitis is an inflammation of the seminal vesicles, closely allied to prostatitis and chronic posterior urethritis; the infection passes directly from the prostatic urethra through the ejaculatory ducts to the seminal vesicles. It may be acute or chronic.

The cause of seminal vesiculitis is the gonococcus and other pyogenic bacteria, especially the colon bacillus, the staphylococcus and the streptococcus. It may be acute or chronic.

Acute Seminal Vesiculitis.—*Symptoms.*—The symptoms of acute seminal vesiculitis are so similar to those of acute prostatitis that a description of it is unnecessary, as it is rare to have one without the other. The only notable difference is the enlargement of the vesicles as felt by the examining finger per rectum. In some cases the vesicles may be swollen and tense or soft and boggy; in others they may be small and hard; while in still others they may be buried in a thick, indurated inflammatory exudate. As a rule they are very tender and when pressed upon give the patient a weak, sickening sensation which may be followed by fainting. Premature ejaculations and nocturnal pollutions, both of which may be bloodstained, may be more pronounced than in prostatitis. Should an abscess develop the symptoms are intensified, the malaise and slight fever being augmented by prostration, chills, fever and sweats, leukocytosis and other evidences of pyogenic infection. Extension of the inflammation to the perivesicular tissues occurs frequently. In fact, it is quite common for the examining finger per rectum to note the marked perivesicular inflammatory thickening of such extension.

The *diagnosis* is made by the history, the symptoms, the microscope and by the examining finger per rectum, when the seminal vesicles can be palpated as swollen, hot, tender masses just beyond and to the outer side of the prostate gland or buried in an indurated inflammatory exudate.

The *prognosis* is good if the patient obeys instructions, but many cases become chronic, followed by loss of sexual vigor, failure of erections and sexual neurasthenia.

Treatment.—The treatment is similar to that of acute prostatitis, with which it is always associated. After the acute symptoms have subsided, massage and stripping the vesicles twice a week and hot rectal irrigations, are used as in acute prostatitis. The passage of sounds cooled in ice water, or heated by electricity, may also prove helpful.

Catheterization of the ejaculatory ducts through the posterior urethroscope with the Young or Livermore needle, using argyrol 10 per cent, mercurochrome 1 per cent, or iodized oil, or better still, a No. 4 catheter may be passed through the McCarthy panendoscope, with special guide attachment to catheterize the ducts, and the desired solution injected. This is a procedure to be attempted only by the expert urologist, as it is a very difficult operation. It may result in injury and severe complications. It

should, therefore, not be attempted unless one has had special training in such work. If this fails to rid the vesicles of infection, vasopuncture or preferably vasotomy may be done.

Vasopuncture consists in the puncture of the vas with a small needle and the injection of a solution into its lumen. It is a delicate procedure, as it is especially difficult to be sure the needle is in the lumen of the vas, for should some of the solution (*e.g.,* argyrol, collargol, etc.) be injected between its coats or into the tissues around the vas, marked edema, swelling and pain will ensue. These complications are exceedingly troublesome to both patient and surgeon, and their persistence adds to the former's dissatisfaction. It is far preferable to perform vasotomy, which consists of isolating the vas and stripping it of its fascial coats, then making a small longitudinal incision into its lumen into which a strand of silkworm gut is introduced. This serves a twofold purpose: First, to determine the patency of the vas and second, it can be used to thread the blunt needle used for injecting the vas, thus ensuring its entrance into the lumen. The solution should be injected slowly and when resistance is felt, should be discontinued at once as the forcible injection of the medicament into the vas will invariably result in damage. The solutions employed are, argyrol 25 per cent, collargol 10 per cent, mercurochrome 2 per cent, and Belfield's iodized oil. Mercurochrome has given exceptionally good results in gonorrheal seminal vesiculitis in the author's hands, although Lowsley and Kerwin state that the prevailing opinion is that mercurochrome is unsuited for use in the vesicles. The author injects 30 c.c., or more, in each vas. A fine catgut suture should close the incision in the vas, only the fascial coats being included in this suture.

Bimanual massage of the vesicles is especially serviceable in emptying them of their contents. This is practiced, according to Reynolds, as the finger in the rectum moves laterally and upward, the other hand being placed upon the abdomen so that its fingers oppose the rectal finger. The vesicle can be recognized by the peculiar feeling it imparts to the opposing fingers as it slips between them. Diathermy has also been recommended, but has not given the results its advocates claimed for it. Massage should be followed by irrigations or instillations of silver nitrate, acriflavin or mercurochrome. Dilatation of the posterior urethra with sounds cooled in ice water, or the Kollmann dilator also may be used.

Instrumentation of the seminal vesicle through the ejaculatory duct is a difficult procedure and its proper and safe performance can be done only after very careful training and study. In some cases it is impossible

to locate the openings of the ducts due to the swollen, edematous condition of the verumontanum, which may also be the seat of granulations or papillomatous growths and so vascular that it bleeds at the merest touch. In such cases it is best to apply 50 per cent carbolic acid in glycerin or 20 per cent silver nitrate and try again in a week or ten days when the congestion of the verumontanum may have subsided sufficiently to make the ducts visible. Should granulations or papillomata cover the ducts, fulguration can be used to destroy the growths, thus bringing the ducts into view.

The forked cannula of Young, or the olivary tip ejaculatory duct catheter of Delzell, or the author's needle, can be used through the endoscope, or a No. 4 ureteral catheter through the McCarthy panendoscope. Argyrol, silvol, neosilvol or mercurochrome can be used, and recently Belfield and Rolnick have recommended iodized oil not only as a medicament but also as a medium for outlining the vesicles with the x-ray. They use the following: Iodol 10 grams in cod-liver oil, 40 c.c., or thymol iodid 10 grams in cod-liver oil, 30 c.c.

Should vasotomy be impossible on account of the blockage of the lumen of the vas, or should it fail to eradicate the infection, seminal vesiculotomy or seminal vesiculectomy may be done.

Seminal vesiculotomy is performed according to the method of Squier as follows: The patient is placed in the extreme lithotomy position and a semilunar incision made across the perineum. The recto-urethralis muscle is divided and by blunt dissection the vesicles are brought into view. A heavy silk suture is now passed through the tissue at the junction of the prostate and bladder. Traction on this suture pulls down the floor of the bladder and brings the vesicles covered by fascia into view. The fascia is incised and the vesicles are punctured. A drainage tube is placed in an incision in the vesicle and held in place by a suture of catgut through the fascia. The perineal wound is closed, to the drain, with silkworm-gut and the drain removed in about fifteen days. Young advises removal of the posterior surface of the vesicle and incision and drainage of the ampullæ and prolonged and multiple drainage.

Should an abscess of the vesicle develop, it should be incised and drained. An abscess may develop in the vesicle, ampulla or the perivesicular tissues. According to Young and Davis, the strong fascia of Denonvillier directs perivesicular abscesses upward and backward toward the tip of the vesicles and may involve the ureter or peritoneum and cause pelvic or general peritonitis. Rarely the intestine or bladder may be per-

forated, giving rise to fistula of the rectum or bladder. Should Denonvillier's fascia be penetrated, the abscess may present in the ischiorectal fossa or perforate into the rectum or travel upward behind the peritoneum. Abscesses on the vesical aspect may rupture into the bladder.

With the above knowledge before us, we should not delay operation when abscess of the vesicle or perivesicular tissues has been diagnosed.

There are several methods of exposing the vesicles, the simplest and best in my opinion being that of Smith and Morrissey, for vesiculectomy as described by Lowsley and Kerwin. After suitable anesthesia the patient is placed well forward upon the table with the scrotum elevated, the buttocks projecting beyond the edge. A sound is placed in the urethra and by palpation upon it the lower limits of the bulbous urethra are accurately determined. A crescentic incision is then made, beginning at one ischial tuberosity, carried in an upward curve through a point just above the termination of the bulbous urethra, where it should be at least 1 centimeter in depth, to the opposite ischial tuberosity. The central perineal tendon is exposed, separated from the lateral fossæ by blunt dissection and sharply divided, care being taken to retain all the bulb fibers in the upper part of the wound, thus reducing hemorrhage.

The usual seminal vesicle retractor is now inserted, the apex of the prostate is brought forward and elevated with this instrument and, with the finger in the rectum, the attachments of the recto-urethralis muscle are separated by sponge dissection; especial care being exercised to avoid injury to the rectal wall. The muscle-fibers should be stretched by gentle tension upon the skin flap, aided by the finger within the rectum, so that they are easily cut with scissors close to their urethral insertion. The remainder of the anterior surface of the prostate is brought into view by gauze dissection and the visible free edges of the levator ani should be carefully detached by the finger and lifted from the wound. The posterior surface of the prostate is cleared of any adherent tissue fibers after which retraction of the gland makes possible a transverse incision just behind its middle axis, the incision being so directed as to avoid severing any engorged vessels which may be visible.

The several layers of fascia described by Lowsley should be identified and separately incised and stripped back. The vesicles can then be palpated by passing the tip of the index finger in front of the fascia and extending it outward along the posterior surface of the prostate. Incising the vesicle and ampullæ is now done, the pus evacuated and drainage inserted. In

vesiculectomy, the vesicle is crushed and removed, ligation being unnecessary. The prostate should be freely incised and suitable drainage instituted. Several tubes supplemented by gauze packing are best. The sound is removed, the edges of the levator ani loosely sutured and the central tendon reunited. The skin is closed with silkworm gut.

Other operations for the incision of abscess of the vesicles or vesiculectomy may be performed by making a crescentic, or inverted V, incision in the perineum, beginning at one ischial tuberosity and ending at the other; the central tendon is then separated from the bulb, the fossæ on each side opened up by blunt dissection and the recto-urethralis muscle cut close to the urethra, allowing the rectum to fall backward out of the operative field; the fascia covering the vesicles can then be picked up with mousetooth forceps, or a tenaculum. When this is incised the vesicle is exposed and the abscess can be punctured and drained. The wound is closed as described above.

Chronic Seminal Vesiculitis.—After the subsidence of an acute inflammation of the seminal vesicles, a chronic inflammation may remain until eradicated by proper treatment.

The *symptoms* vary with the disposition of the patient. There may be vague pains in the perineum, rectum, back or thighs, and a sense of weight and pressure over the bladder. The pains may radiate in various directions, but especially to the rectum and down the back of the thighs. In some there is marked increase in sexual desire, while in others there may be complete absence of erection. Nocturnal emissions, which are often brownish, or distinctly bloody and premature ejaculations are frequently complained of. There may be a mucopurulent or mucous discharge from the external meatus on awakening in the morning or it may appear only after straining at stool. In others, there may be few symptoms, the patient coming to the physician simply because he notices a slight stickiness at the meatus and is passing cloudy or shreddy urine. And there may be still others who may have any combination of the above symptoms and in addition an arthritis involving one or more joints—the vesicle being the focus of infection.

The *diagnosis* is made by the radiating pains, general ill health, sexual neuroses and scanty discharge, microscopical examination of the secretion from prostate and seminal vesicles, the symptoms, and by rectal examination; being so similar to and usually occurring with chronic prostatitis, the diagnosis of the one condition means a diagnosis of the other. The vesicles are palpable only when they are the seat of inflammation, but

the prostate may be involved without enlargement and without symptoms referable to it.

The *prognosis* should be guarded. It is a condition very difficult to cure, requiring long-continued treatment, and the patient is often not relieved until vasotomy or seminal vesiculectomy has been done. Even though the gonococci have been eradicated the neurasthenic and rheumatic symptoms may persist.

Treatment.—The treatment consists in massage of the prostate and vesicles per rectum, especially stripping the vesicles by means of bimanual massage, and the usual treatment as given above for chronic posterior gonorrhea. Hot rectal irrigations, the passage of sounds, cooled in ice water and coated with silver nitrate, 1 per cent, in cocoa butter, or sounds heated by electricity, and dilating the prostatic urethra with the Kollmann dilator to 40 to 45 French should be tried and may prove helpful. If these fail, the patient should be referred to the specialist for catheterization of the ejaculatory ducts through the urethroscope or McCarthy's panendoscope. This may afford relief, but vasotomy and even seminal vesiculectomy may be necessary to effect a cure.

Catheterization of the ejaculatory ducts as described before and topical applications of 20 per cent silver nitrate, 50 per cent carbolic, or tincture of iodin to the verumontanum through the Swinburne posterior urethroscope, or fulguration of the verumontanum through the cysto-urethroscope or panendoscope, often afford relief of pain and check premature ejaculations and nocturnal emissions. They also have a splendid effect upon the neurasthenic symptoms, though bromids, dial, veronal or luminal may be necessary to allay nervousness and produce sleep. The therapeutic lamp and diathermy may also help.

EPIDIDYMITIS

Epididymitis, one of the most common complications of gonorrhea, is an extension of the disease by way of the vas to the epididymis. It usually involves one testicle, though both may become affected. It may be acute or chronic and is the most frequent of all complications. Luys says it occurs in 25 per cent of cases and the author is sure this percentage is not too high.

The cause of epididymitis is the gonococcus. Colon bacillus and tuberculous infection also occurs, but neither of the latter two is included in the scope of this work. The gonococcus gains access to the epididymis by

way of the ejaculatory duct and vas deferens. Ullmann, however, claims that the gonococcus can reach the epididymis by way of the lymphatics. Epididymitis occurs in patients while under treatment, in those who are using no treatment at all, and even in those who have uncured cases, but who have almost forgotten they ever had gonorrhea.

It may follow injury of the testicle, massage of the prostate or the passage of a sound or urethroscope, a strain or any violent exercise, and the indulgence in alcoholic drinks or sexual intercourse.

Symptoms.—In some cases the first symptom of acute epididymitis is a dull, aching pain over the internal abdominal ring. This is due to the compression of the swollen and inflamed cord by the contraction of the abdominal muscles as it passes through the internal ring to enter the inguinal canal. There may also be a sense of pain and heaviness in the testicle and in many cases it is the first symptom; the epididymis and even the entire testicle may be very tender. The epididymis can be palpated as an indurated, tender mass on the posterior aspect of the testicle. The tail of the epididymis or globus minor is usually first involved, to be soon followed by the head or globus major and finally the entire testicle. The pain, which at first is a heavy ache, soon becomes severe, and in some cases so agonizing that the author has seen splendid athletic men writhing in misery and crying like babies. The epididymis and testicle may soon become one hard, swollen, painful mass, three to five times their normal size and the skin of the scrotum over the affected side is red, hot, edematous and tender. The vas is often swollen, indurated and painful, sometimes becoming three-eighths to one-half inch in diameter. There is also usually more or less hydrocele fluid present. The discharge from the meatus diminishes or ceases entirely.

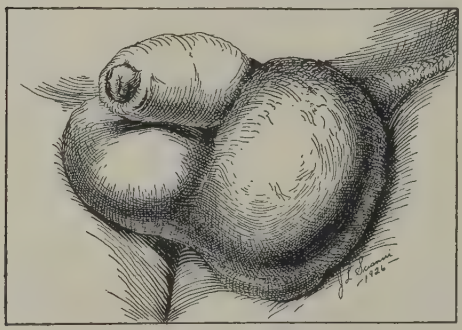

Fig. 19.—Gonorrheal Epididymitis.

Diagnosis.—A painful swelling, involving the epididymis, and perhaps the spermatic cord, is in the majority of cases gonorrheal. Examination reveals the swollen, painful and tender epididymis and testicle, and demonstration of the gonococcus makes the diagnosis positive. Clinical statistics

of later date give the incidence as 8 per cent in clinic patients and 4.7 per cent in private cases. In my experience this is far too low, being nearer 25 per cent.

Prognosis.—The prognosis is good as to relief of pain and swelling, but it may last from one to four weeks and be followed by abscess formation and atrophy. Sterility may result on the side involved due to blocking of the vas or the tubules of the epididymis. Watson and Cunningham, quoting Benzla, say 10 per cent of soldiers of the German army who had gonorrhea were childless, that of those who had had unilateral epididymitis the percentage was 23.4, while of those who had had bilateral epididymitis the percentage was 41.7. These may be statistics of the German army, but the author is certain these percentages are too high for the United States, for he has seen many cases of bilateral epididymitis in patients who are now fathers of families and only a few in whom the absence of spermatozoa in their semen has proved them sterile.

Treatment.—The treatment may be non-operative or operative. If we knew exactly how long each case would last, the choice of treatment would be simple, but often the most acute cases subside promptly while the milder ones develop slowly and often prove refractory. If we knew a case would last more than ten days, the operative treatment would be best, but no one can predict at the start what the outcome will be. It is my practice to advise operation in the very acute cases with severe pain and marked swelling of the entire organ and defer such advice in the milder types until such time as acuter symptoms develop. When epididymitis develops, all urethral treatment and instrumentation should be discontinued.

The non-operative treatment consists of rest in bed, elevation of the testicles by means of adhesive straps from one thigh to the other, the so-called "Bellevue Bridge" or adhesive bandage. Then apply hot or cold applications or an ice-bag. We may also apply ichthyol ointment 25 per cent to 50 per cent, guaiacol ointment 10 per cent in glycerin or lanolin (be sure to tell the patient that the latter will burn considerably for a short time after it is applied and then subside), and an ice-bag or hot water bottle can then be placed over the dressing. Morphin or codein may be necessary to relieve the pain.

In some cases strapping the testicle well up on the abdomen with adhesive plaster and the application of an ice-bag may prove very efficacious. The adhesive strapping should be applied so as to make the patient feel a sense of relief. If it is too tight it will do more harm than good. The comfort of the patient is our guide in its application. There has been

some controversy about the ice-bag being more likely to produce sterility, but I think this fear is unfounded. Evacuation of the hydrocele fluid, when of considerable amount, often relieves the pain and it is well to strap the testicle with adhesive after its withdrawal, preventing its reaccumulation. Spraying the testicle with ethyl chlorid has been recommended by Luys.

Diathermy is also advocated by Corbus, O'Conor and others, but has not given the author the results claimed for it. Corbus and O'Conor devised a special scrotal thermophore. The testicle and epididymis are enclosed between the instrument and heated by means of the d'Arsonval current to 104° to 106° F. (40° to 41.5° C.) for forty minutes. The plates should be covered with a thick layer of shaving cream. Should the cord be also involved, one plate should be placed in the region of the internal abdominal ring and the other over the lower extremity of the testicle and epididymis. Corbus and O'Conor say that, if the case is seen early, within the first twelve to twenty-four hours, one treatment checks the attack. After several days, three or four treatments may be necessary. Carl Moore of the University of Chicago, according to Graves, in a series of experiments on animals by applying heat of slightly higher than normal temperature to the surface of the scrotum, found that degeneration of the generative portion of the testis followed in part or entire. It may be visible within a period of four to six days after subjecting the scrotum to a single application of heat that is but 7° C. above normal body-temperature. Similar reactions follow the application of heat whether given by electric light, electric stove or hot water.

If we are to accept the work of Moore, and it is interesting to note that similar experiments and conclusions have been presented separately by Fukui in the *Japan Medical World,* it is at least strongly suggested that diathermy as now applied to acute scrotal infections may not be the entirely innocuous procedure that we have believed it to be (Review Dept., *Urol. & Cutan. Rev.,* June, 1927). Ten c.c. of a 1 per cent solution of calcium chlorid given intravenously has recently been favorably commented upon. The author's results have been disappointing. Sodium iodid, 15½ grains (1 gram), intravenously, has proved more satisfactory, though it is by no means a specific.

Gonococcic vaccine in doses of 50,000,000, increased gradually every four days, have been recommended, and in some cases may seem to help, but there is no uniformity in its action and hence it cannot be relied upon. This is the consensus of opinion among the best urologists of America. Injections of boiled milk, 5 to 10 c.c., lactogen or aolan in the same dosage,

may also be tried. Although the author has read many laudatory reports of the efficacy of this treatment, personally he has had little success with it.

After the acute inflammation has subsided and the patient is able to be up without pain and the tenderness has practically disappeared, resolution of the induration and swelling of both the epididymis and testicle may be hastened by strapping the testicle with circular strips of adhesive plaster. If it is applied too tightly or before the acute tenderness has subsided it may cause an exacerbation of the acute condition. The Bellevue-Alexander [1] bandage may answer the purpose of the adhesive strapping, but personally I prefer the latter. Should the patient return to work too soon or should the physician resume the treatment too early, a recurrent attack is very prone to result. It is best to delay urethral treatment for two weeks after all the acute symptoms have subsided.

Operative Treatment.—This is called epididymotomy, performed, according to Hagner, as follows: "At the juncture of the swollen epididymis and testicle, an incision, 6 to 10 cm. in length, depending upon the amount of enlargement, is made through the scrotum down to the tunica vaginalis, which is opened at the junction of the epididymis and testicle. After the serous membrane is opened, all the fluid is evacuated and the enlarged epididymis is examined through the wound. The testicle with its adnexa is delivered from the tunica vaginalis and enveloped in warm towels. The epididymis is then examined and multiple punctures made through its fibrous covering, with a tenotome, especially over those portions where the enlargement and thickening are greatest. The knife is carried deep enough to penetrate the thickened fibrous capsule and enter the infiltrated connective tissue.

"When the knife is through the thickened covering of the epididymis, a very marked lessening of resistance will be felt. If pus be seen to escape from any of the punctures, the opening is enlarged and a small probe inserted in the direction from which the pus flows. By this method I believe

[1] From George G. Smith's *Outline of Genito-Urinary Surgery.*

The Bellevue-Alexander bandage consists of a strip of gauze 3 feet long by 20 inches wide, folded twice so as to make a strip 3 feet long and 5 inches wide. To the middle of one edge is sewed the middle point of a piece of 2 inch bandage 3 feet long. Another gauze or flannel bandage is used to act as a waistband. The point where the bandage is sewed to the gauze is placed on the perineum. The bandage ends pass one under each thigh and fasten to the waistband. The lower edges of the gauze strip are carried tightly around the base of the scrotum and at the root of the penis are pinned together. The same edges higher up are pinned to the waistband. The free edges of the gauze strip are then pinned tightly over the scrotum. A tuck is made at the bottom of the scrotum to make the bandage fit better. By drawing upward upon the free edges, the whole scrotum is crowding against the pubes, thereby giving all the compression desired.

there is less danger of injuring the tubes of the epididymis than by cutting with the knife. After the probe is passed in, pus will be evacuated by light massage in the region of the abscess and a fine pointed syringe is used to wash out the cavity with 1 : 1000 bichlorid of mercury, followed by physiological salt solution. The testicle is then restored to its normal position and in every case the tunica vaginalis is thoroughly washed with 1:1000 bichlorid, followed by normal salt solution. The incision of the tunica vaginalis is lightly closed with a running catgut suture; a cigarette drain of gauze is then laid over the incision, the skin being brought together with a subcutaneous silver wire suture, the cigarette drain passing out at the lower angle of the wound."

Barringer says it has not been determined whether the operation increases or decreases the incidence of sterility and that the operation should only be considered in the very acute cases. Operations for the relief of azoöspermia, due to induration of the epididymis and probable blocking of the tubules of the globus minor, or its connection with the vas, have been devised by Martin and Lespinasse.

Martin's epididymovasotomy is performed by making an anastomosis of the head of the epididymis with the vas. The testicle is lifted out of the scrotum and the vas and globus major exposed. An incision is made in the globus major and the escaping semen is examined for spermatozoa. If none are found incisions are made in other areas until they are found. The lumen of the vas is then opened by a longitudinal incision about a half inch long and its edges sutured to the edges of the incision in the globus major. Fine silver wire and very small needles are used.

Lespinasse's operation is similar, except that he uses a fine silk ligature to cut the anastomosis between a tubule, containing spermatozoa, and the vas. It is passed through the lumen of the tubule into the lumen of the vas, then through the wall of the vas and through the skin of the scrotum. This is see-sawed each day until the walls of the tubule and vas are cut through, thus making a communication between them. Before operating, the patient should be free of gonococci and the patency of the vas determined (Barringer).

CYSTITIS

Cystitis is an inflammation of the bladder which, as far as this text is concerned, is due to the gonococcus. This work is concerned only with gonorrheal infection of the bladder. A urethrocystitis of varying severity

occurs in every case of acute posterior gonorrhea, but a gonorrheal cystitis involving more than the trigone is extremely rare.

The gonococcus is the principal causative agent, but other pyogenic bacteria, notably the colon bacillus and the staphylococcus, may also play a part.

Symptoms.—The chief symptoms are pain, frequency and tenesmus, and the urine is often blood-stained. There may be anorexia, malaise and fever, though the last is rarely more than one or two degrees. On palpation there may be some tenderness over the bladder. The dysuria, tenesmus and constant desire to void make the patient feel that he is a very sick man.

The urine is cloudy and contains pus, mucus, blood, epithelial cells, gonococci and other bacteria.

Diagnosis.—The diagnosis is made by the history, the symptoms and by finding the gonococcus in the urine. With the two-glass test, both glasses are cloudy, or bloody. In order to make this test of value, the anterior urethra should be irrigated thoroughly with boric acid solution before the patient voids.

Prognosis.—The prognosis is good as to relief of symptoms, but the gonococcus must be eradicated before the patient is pronounced cured.

Treatment.—The patient should be put to bed and all urethral and bladder instrumentation and treatment discontinued. He should be given hot sitz-baths and hot rectal irrigations of saline. Hot or cold applications may be applied over the bladder or perineum or both. He should drink water freely, at least a glass every hour, and his urine should be rendered alkaline by the administration of alkalis, such as potassium citrate, acetate or bicarbonate, in 30 grain (2 gram) doses four to six times a day. Sodium bicarbonate in 60 grain (4 gram) doses may also be used, but is more likely to upset the digestion. For the tenesmus, hyoscyamus and belladonna often give great relief.

The following prescriptions have proved very efficacious in the author's hands:

℞

Pot. cit.	℥ i	(30.00 c.c.)
Tr. bellad.	ʒ iiss	(10.00 c.c.)
Tr. hyosc.	ʒ v	(20.00 c.c.)
Aq. dest. q.s. ad.	℥ iv	(120.00 c.c.)

M. Sig. Two teaspoonfuls in water three times daily, after meals and at bedtime.

℞

Liq. pot. .....℥ ss (15.00 c.c.)
Fldext. tritic. .....℥ iss (45.00 c.c.)
Fldext. uvæ ursi ....℥ iss (45.00 c.c.)
Aq. dest. q.s. ad. ....℥ iv (120.00 c.c.)

M. Sig. One teaspoonful in water three times daily, after meals and at bedtime.

Santal oil in 10 to 15 minim (0.6 to 1 c.c.) doses in capsules four times a day, or compound methylene-blue tablets may also aid in relieving the frequency and burning. The pain and tenesmus, however, may be so severe, it may be necessary to use morphin or codein. A suppository of opium, belladonna and hyoscyamus is very satisfactory for this purpose. If this suppository is used, hyoscyamus and belladonna should not be given by mouth.

After the acute symptoms subside, irrigations of the bladder should be begun and the usual treatment for acute posterior gonorrhea instituted. Weak solutions of acriflavin (1: 10,000) or protargol (1: 500) are especially serviceable to begin with; later stronger solutions of the same, or potassium permanganate may be used. Finally, when all acute symptoms have subsided and the urine is clear and only contains shreds, silver nitrate may be used. Exacerbations may be brought on by indulgence in exercise, alcohol or sexual intercourse.

PYELITIS AND PYELONEPHRITIS

Pyelitis, which the author believes is always a pyelonephritis, means an inflammation of the pelvis and parenchyma of the kidney.

It is due, as a complication of gonorrhea, to the gonococcus alone or with other bacteria. It is quite rare, only a very few cases have been reported in the literature. It may be brought about by direct infection, following cystoscopy in patients with subacute or chronic gonorrhea, especially in men who have had gonorrhea some years ago and who think they are well. Stricture of the urethra and obstructions at the bladder neck are also predisposing factors. Luys says the too zealous administration of the balsams may also irritate the renal epithelium and render it susceptible to infection. The gonococcus may be carried to the kidney by way of the ureter, the lymphatics and the blood stream.

Symptoms.—The onset may be acute, with chills, fever, sweats and pain in the loin, or it may occur insidiously with low-grade temperature

and little or no pain in the kidney. In fact, the symptoms are similar to those of pyelitis due to other pyogenic bacteria. There may or may not be pain on palpation of the affected kidney.

Diagnosis.—The diagnosis is made by finding gonococci in the urine from one or both kidneys. Great care should be exercised to avoid carrying infection from the urethra and bladder to the kidneys in suspected cases. No patient with urethral neisserian infection should have ureteral catheters inserted unless all other causes for the symptoms have been ruled out.

Treatment.—The treatment is similar to that of pyelitis due to other pyogenic bacteria. Rest, simple diet, water and alkalis by mouth; glucose and soda per rectum. Vaccines (50,000 dead gonococci), gradually increased every four days, are recommended, but are of doubtful value. Pelvic lavage with argyrol 20 per cent, neosilvol 25 per cent, mercurochrome 1 to 2 per cent, silver nitrate 0.5 to 1 per cent, offers most in the way of cure. If the temperature is high, an indwelling ureteral catheter, through which boric acid, saline, or any of the milder solutions may be injected, will often work wonders.

STRICTURE OF THE URETHRA

A stricture of the urethra is a diminution in the lumen of the urethra, or its complete occlusion, caused by the formation of cicatricial tissue and the contraction thereof. It is said that the bulbous urethra is the chief seat of stricture. The author believes this is probably true in free clinics, but that the penile urethra is the chief seat of stricture in private practice.

A stricture may be single or multiple and in some cases there are so many that a bougie à boule "bumps" over them like an automobile on a corduroy road.

Varieties.—*(1) Linear, (2) Annular, (3) Tortuous.*—A linear stricture is a thin circular band of scar tissue. An annular stricture is a wide or ribbonlike band of scar tissue. A tortuous stricture is one in which there are irregular, indurated areas in the urethra which give rise to a tortuous passage through it.

There are also strictures composed of yellow elastic fibers, which, when dilated, soon recontract to their original size and these are called elastic strictures. There may be a muscular spasm of the muscle-fibers of the urethra that grasps an instrument so tightly it cannot be passed. This is called a spasmodic stricture, but is in no sense a true stricture. It may

usually be easily relaxed by the injection of alypin 2 per cent into the urethra.

Pathology.—As a result of the inflammation produced by the gonococcus, there is a round-celled infiltration in the submucous tissues. Later these round cells are replaced by connective-tissue cells which soon produce a fibrous or scar tissue, thus giving rise to a true stricture.

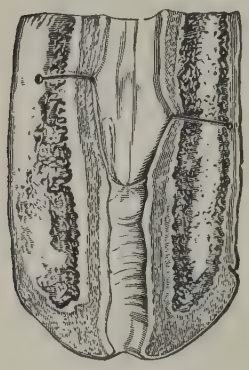

Fig. 20.—Stricture of Anterior Urethra. (Voillemier)

All strictures due to gonorrhea are soft and easily ironed out at first but after the round cells have been replaced by connective-tissue cells and fibrous tissue has formed, there is a true fibrous stricture which is similar in all respects to the fibrous tissue in a cicatrix. Therefore, where once a true fibrous stricture has developed we know that "once a stricture always a stricture."

Etiology.—A stricture is due in the great majority of cases to gonorrhea, but it may be caused by trauma or by cicatricial contraction following ulceration. It may also be congenital in the form of a congenitally small external meatus which is very frequent or in the form of the folds or valves in the urethra, which are very rare.

Strictures due to gonorrhea rarely occur in less than six months to a year, but the author has seen cases which developed in two months.

Symptoms.—The symptoms of stricture of the urethra may vary from those whose only symptom is a few shreds in the urine to those with complete retention, tenesmus, hemorrhoids, fistulous tracts in the perineum, scrotum, thighs, and inguinal regions, infected hydronephroses, uremia, etc. The symptoms may be mild, even in those with a stricture of small caliber. The author has seen cases in which only a filiform could be passed with difficulty, void a fair stream, and except for some increased frequency of urination and nocturia once or twice, were really inconvenienced so little that they were dumfounded to learn they had a stricture. Frequently the one symptom that brings them to the physician is nocturia and it is again surprising to see cases with a large caliber stricture 20 to 25 French in whom this symptom is very annoying. Usually there is a morning drop, or at least some gluing of the meatus on arising and the urine contains shreds (the "Tripperfaden" of the Germans) or is distinctly cloudy. On account of the obstruction to the flow of urine, there is usually some dilatation of the urethra behind the stricture, with more or less

chronic inflammation of the urethra and bladder. Consequently, there is usually a discharge with frequency of urination and pain. In the majority of cases there is dribbling of urine after urination due to the collection of urine in the dilated pouch behind the stricture, which dribbles out after the patient has finished voiding. As the obstruction becomes more

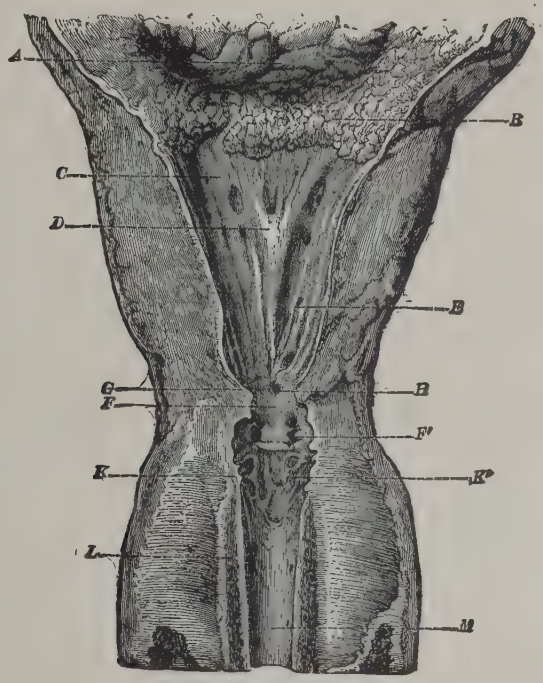

FIG. 21.—STRICTURE OF MEMBRANOUS URETHRA.

A, bladder; *B*, bladder neck; *C*, dilated prostatic urethra; *D*, verumontanum; *E*, one of the prostatic ducts; *F*, *G*, *K*, the stricture; *F*, dilatations in front of the tightest part of the stricture; *H*, orifice of small abscess cavity; *K*, mucous membrane in front of the stricture, thin and ulcerated; *L*, corpus spongiosum; *M*, anterior urethra. (Voillemier)

marked, due to the contraction of the fibrous tissue, the bladder wall hypertrophies, but unfortunately it does not do so uniformly. With the increased strain put upon the bladder to force the urine through the obstruction, the bladder wall becomes thickened in some areas and thinned out in others, giving rise to a ridged appearance known as trabeculation. The stream loses its force and, in the tight strictures, comes in drops

and only after severe straining and tenesmus. The urine may be blood-stained and frequently the bowels move at each attempt at urination.

If not relieved by dilatations, the constant straining may cause a hernia, hemorrhoids or even prolapse of the rectum. Complete retention

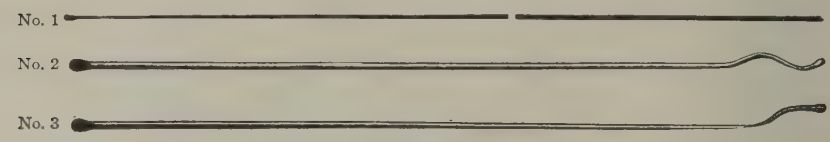

Fig. 22.—Filiform Bougies.

No. 1, straight; No. 2, with a spiral end; No. 3, with a bend near the end. (Guiteras)

may occur at any time due to contraction of the stricture or to congestion and swelling of the inflamed urethral mucosa. This is especially likely to occur following exposure to cold, fatigue, alcoholic or sexual excess, or to attempts at dilatation with filiforms or sounds. In some cases, there may be a constant dribbling of urine or incontinence, due either to

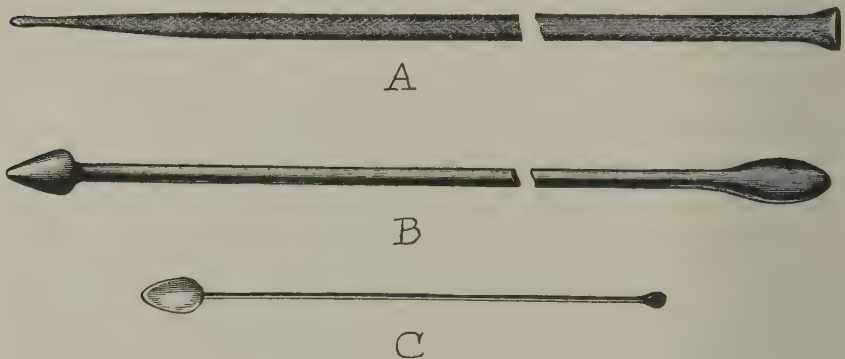

Fig. 23.—Bougies.

A. Olivary, French gum elastic bougie, sizes 8 to 30 French.
B. Gum elastic bougie à boule, sizes 8 to 30 French.
C. Otis' metal bougie, sizes 8 to 40 French, acorn tip.

weakening of the muscular tone of the sphincters or to overdistention of the bladder. In the latter condition the incontinence is due to the forcing of the urine through the sphincters and stricture because the bladder is already distended to its capacity and there is nowhere else for it to go.

Diagnosis.—The diagnosis of stricture of the urethra must be made by exploration with specially designed instruments which meet resistance

when the stricture is reached. From the symptoms alone diagnosis will be uncertain.

These instruments are sounds, filiforms, olivary bougies, bougies à boule, or acorn-tipped bougies, urethroscopes and the urethrometer.

Filiforms are made of whalebone and are about the size of a small straw and have an olivary tip at each end. Some are perfectly straight while others are bent at an obtuse angle or twisted and curved like a

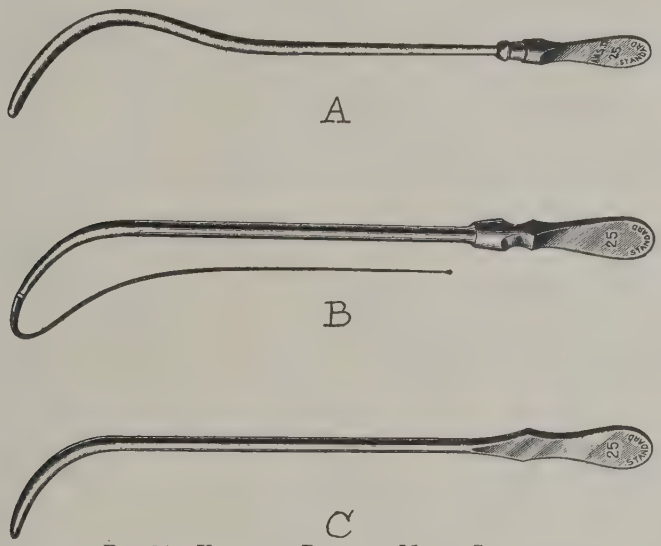

FIG. 24.—URETHRAL DILATING METAL SOUNDS.

A. Ideal, tapering toward the handle, Béniqué curve, 8 to 40 French, one piece or two pieces.
B. LeFort's, exploring, with filiform guide, extra fine.
C. Van Buren's or Guyon's, curved, 8 to 40 French, one piece or two pieces.

corkscrew near one tip to facilitate their passage through tortuous strictures. Olivary bougies are flexible, woven silk, straight instruments about 12 inches in length and varying in size from a 3 French to a 36 French. The shaft of the instrument diminishes in size as it approaches the tip, where there is a constriction known as the neck; then the tip bulges into an olive-shaped end which is several sizes smaller than the shaft.

The bougie à boule is made of woven silk and flexible, or made of steel with the shaft about a 6 French in diameter and terminating in an acorn shaped tip. The sizes are about the same as the olivary bougies. Sounds are metal, nickel plated or nickloid instruments about 12 inches in length,

which are circular and terminate in various shaped curves. The plain curved sound tapering near its tip is the Guyon sound, while the straight shaft with a gooseneck curve and larger at its curved end than in the shaft is the Béniqué sound. Sounds are made in all sizes from 7 or 8 to 36 French, though Béniqué sounds are usually made in sizes from 12 to 36 French. A scale plate should also be at hand to measure any instrument used. The urethrometer is an instrument with an 8 French shaft, which near its tip has a bulb made up of short branches which open and close, increasing and diminishing its diameter, the size being registered on a dial near the opposite end in which there is a screw. This, when turned, opens or closes the bulb. When closed, it is about a 16 and when opened may expand to 40 or 45 French.

In making a diagnosis of stricture it is well to bear in mind the danger of injury and infection to the urethra, for in no other branch of surgery are gentleness and cleanliness more essential than in the passage of instruments into the urethra, especially in cases of stricture. It is also of importance that no instrument be passed into the urethra unless the patient has been given urotropin or santal oil or other urinary antiseptic for at least forty-eight hours before instrumentation is attempted. In cases of complete retention, of course, this rule does not apply, as the patient must be relieved at once and we cannot wait forty-eight hours before making some attempt to evacuate his urine. In these cases, however, much can be accomplished by giving the patient urotropin at once and fortifying him against urethral chill and fever by the administration of combined vaccine or after they have developed, to check them, by giving uritone 31 grains intravenously, or 10 to 20 c.c. of 1 per cent mercurochrome in 50 per cent glucose in the same manner. In the diagnosis of stricture, unless there are symptoms suggestive of a filiform stricture, we should try the larger bougies à boule first and if these fail to pass, smaller ones can be used until one slips beyond the stricture. When withdrawn its shoulders will impinge upon the stricture, and in this manner, by measuring the distance from the meatus to the face of the stricture with the size which will not pass and then the distance from the meatus to the back of the stricture with the one which has passed, but impinges on withdrawal, we can easily ascertain the width of the stricture.

In examining for a stricture, the penis should be cleansed with soap and water and then with some antiseptic such as alcohol, lysol or mercuric bichlorid. The patient should then urinate, if he can, and lie down upon the operating table with his head and shoulders elevated so as to relax the

abdominal and perineal muscles. The urethra should be filled with 1 or 2 per cent tutocain, butyn or alypin solution (cocain is dangerous and has no place in genito-urinary surgery). After waiting ten minutes, this solution is allowed to escape and the urethra is then filled with a warm water soluble lubricant (KY, luzo or Mulford's lubricant being types). Oily substances have no place in urethral or bladder instrumentation except in filiform strictures and here gomenol oil is best because it is antiseptic and analgesic.

Attempts should now be made to locate and determine the caliber of the stricture or strictures. If the small bougie à boule will not pass beyond the stricture, then filiforms should be used. It is best to put four to six filiforms in the urethra, as several tips are more likely to locate the opening in the stricture than one.

Prognosis.—The prognosis of stricture depends upon the kind, number, complications, the length of time it has been present, the temperament of the patient and the thoroughness with which the treatment is carried out. When a patient has developed a fibrous stricture he can be relieved but never cured. He must report to the physician twice a year as long as he lives, for only in this way can future contraction of the stricture and serious consequences be prevented.

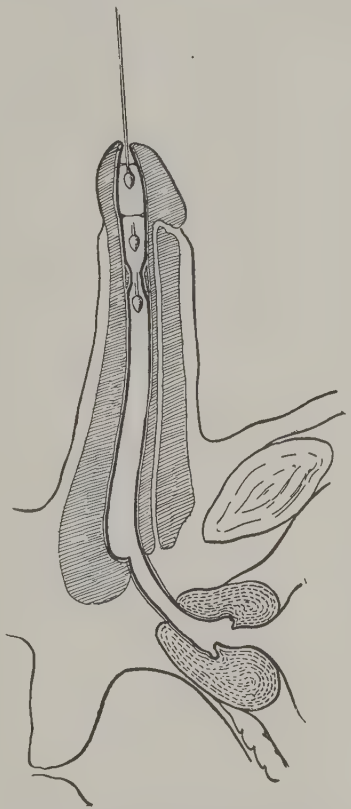

Fig. 25.—The Bougie à Boule Moving down the Urethra through a Strictured Area. (Guiteras)

Complications.—Abscesses and fistulæ may develop due to the obstruction of the urinary stream caused by the stricture and the resultant back pressure on the urethra, bladder, ureters and kidneys behind it. The urethra, behind the stricture, becomes dilated and its mucous membrane thickened by the chronic inflammation resulting from the obstruction. The orifices of the prostatic sinuses, ejaculatory ducts and lacunæ or follicles of the urethra become dilated and inflamed. The infected urine may escape into these follicles or lacunæ, producing infection and abscess formation.

These abscesses rupture into the urethra and discharge their contents, thus making a deeper pocket for the foul urine to collect in and infect. Another abscess forms, rupturing again into the urethra, thus deepening the follicle, and so it continues abscessing and rupturing and burrowing until it reaches the skin of the scrotum, perineum, thighs, buttocks, pubes or groins, discharging pus and urine and forming a urinary fistula. This gives an outlet to the urine behind the stricture and often we see patients with numbers of these fistulæ through which they void with remarkable ease. In some cases not a drop of urine issues from the meatus, while in others part of the urine is expelled from the urethra while the rest trickles out through the fistula or fistulæ.

In still other cases no fistula is formed, as the abscess in the follicle does not rupture into the urethra, but burrows into the perineum, scrotum, groin, etc., and forms a large abscess, causing severe pain and constitutional symptoms, with chills, fever, sweats and vomiting. Sometimes the abscess ruptures and forms a fistula before the patient seeks relief. If it has not ruptured it should be incised and drained and an external urethrotomy done.

Prostatitis, seminal vesiculitis and epididymitis may be caused by a stricture; and hernia, hemorrhoids and prolapse of the rectum may result from the straining at urination. Abscess of the prostate may also occur as the result of infection being forced into the prostatic sinuses.

Diverticulum of the bladder is a complication that may result from back pressure, being a dilation of the thinned-out bladder wall between the thickened bands or trabeculæ. There is some dispute as to whether a diverticulum of the bladder is congenital or acquired, but there is no doubt that stricture of the urethra affords the etiological factor that precipitates matters and is the cause of many diverticula which would otherwise have remained symptomless.

Hydro-ureter, hydronephrosis, pyelonephritis and pyonephrosis may also be caused by neglected and untreated stricture.

Extravasation of Urine.—One of the most dangerous complications and one frequently seen among the Negroes in the South is extravasation of urine. It is an escape of urine into the periurethral tissues following a rupture of the urethra behind the stricture and caused by the violent straining during attempts at urination in cases of small caliber strictures.

Etiology.—The urethral walls behind the stricture become dilated and the mucous membrane inflamed and thickened. As the back pressure becomes greater there is thinning of the urethral wall and the chronic

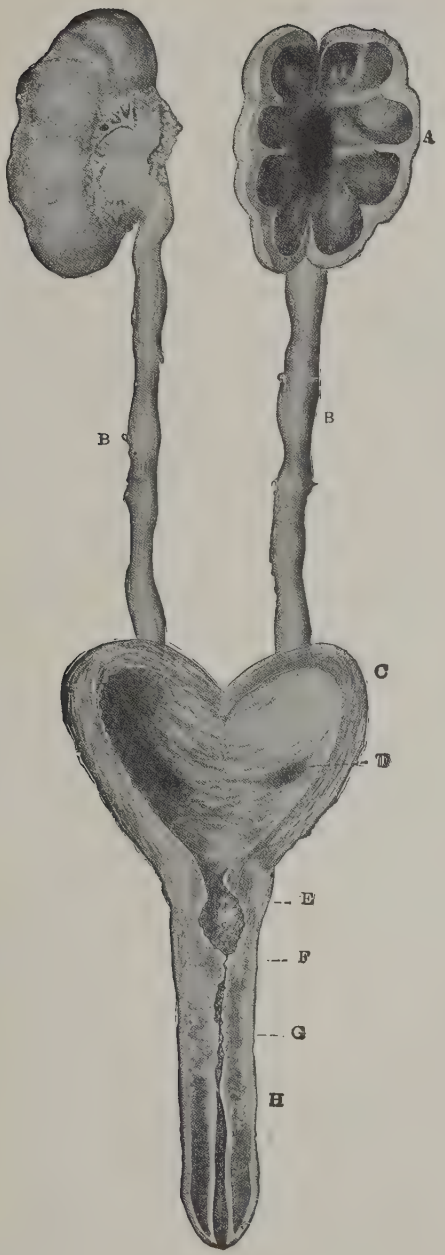

FIG. 26.—RESULTS OF STRICTURE.

A, A, Kidneys dilated, sclerosed, pyonephrotic; *B, B,* ureters irregularly dilated; *C,* bladder contracted and thickened (concentric hypertrophy); *D,* dilated ureteral orifice; *E,* prostatic urethra dilated (prostatic abscess); *F-H,* the stricture; *F,* its tightest point; *G,* corpora cavernosa involved in the scar. (Keyes)

inflammation softens the mucosa and makes it less resistant. Under the terrific straining and tenesmus in attempts to void, the urethra ruptures and the foul, infected urine escapes into the surrounding tissues. It may rupture in any of the following regions: (1) Anywhere from the meatus to the penoscrotal junction; (2) between the penoscrotal junction and the anterior layer of the triangular ligament; (3) between the two layers of the triangular ligament; (4) behind the posterior layer of the triangular ligament. Sometimes rupture may take place at the juncture of any of these regions.

Symptoms.—While attempting to void, the patient feels something in the penis or the perineum give way and immediately experiences a sensation of relief. This, however, is only short-lived, for it is soon followed by swelling of the penis, scrotum, perineum or hypogastrium, depending upon the location of the rupture. Soon he has fever with chilly sensations, followed later by actual chills, high fever and sweats. He is acutely ill and if not relieved by prompt operation will soon go into profound shock. At first, the skin over the swelling is red, shiny and edematous, but it soon becomes discolored, sloughy and gangrenous, and often gas can be felt beneath the skin, the so-called crepitus of air in the tissues.

If the urethra ruptures in the penile portion, the penis is the part involved. When it occurs between the penoscrotal junction and the anterior layer of the triangular ligament, the scrotum and hypogastrium are involved. When between the two layers of the triangular ligament, it passes downward between these layers and makes its way backward into the pelvic cavity or may burrow forward into the perineum. When behind the posterior layer of the triangular ligament, it passes into the space between the rectum and bladder and works downward to the perineum or upward into the pelvis or in front of the bladder and may even rupture into the peritoneal cavity.

The diagnosis is made by the history, the symptoms and the examination. A case once seen will never be forgotten.

Prognosis.—It is one of the most serious of urological affections. If operated and drainage is instituted shortly after extravasation has occurred, the prognosis is good, but in the late cases where gangrene has resulted, the mortality is more than 50 per cent. Recovery in the gangrenous cases is a slow process and frequently extensive skin-grafting or in fact a plastic operation to make a new scrotum is often required.

Treatment.—Regardless of the extent of the rupture and the amount of extravasation, diverting the urine in the bladder away from the

rupture by means of a tube through the perineum, the drainage of the extravasated urine from the tissues with rubber tubes, mercurochrome or acriflavin gauze packing, and the cutting of the stricture are necessary for the relief of the patient. It must be done as soon as the diagnosis is made, for delay means more extravasation, greater damage to the tissues from abscess and gangrene and more likelihood of death from septicemia and toxemia. Sacral anesthesia is best, or the patient is put under gas-oxygen, or ethylene anesthesia, having one-half hour previously been given a hypodermic injection (morphin ¼ grain and atropin $\frac{1}{150}$ grain dissolved in 2 c.c. of a 25 per cent solution of magnesium sulphate). He is placed in the lithotomy position and an external urethrotomy done as described later under the treatment of stricture of the urethra. The stricture is cut, the urethra thoroughly dilated and a large tube placed in the bladder and brought out through the perineal wound. All areas in which the urine has extravasated or where abscess and gangrene have formed, should be incised freely, urine and pus evacuated and as much of the gangrenous tissue as possible removed. Care should be exercised not to open up too much denuded healthy tissue for fear of increasing septic absorption.

The wounds are thoroughly cleansed with saline, and drainage tubes freely inserted. Gauze saturated with mercurochrome 2 per cent or acriflavin, 1 : 1000, should be packed about them. The antiseptic can be injected through the drainage tubes at regular intervals after the patient has been returned to bed, and the dressings changed two ar three times daily. Stimulants, such as caffein sodiobenzoate, 2 grains every four hours, or digifolin, 1 c.c. at similar intervals should be given, and water by mouth, by rectum, by skin or by vein is imperative. Glucose and soda per rectum and also glucose 5 per cent intravenously is excellent and every effort should be made to combat shock and sepsis. In the septic or toxic cases, blood transfusion is a valuable aid and should be used early before the patient is too far gone to derive benefit from it.

The incisions and drainage of the extravasated tissues should be extensive and thorough, and that it may be made impressive, I am reminded of a story told by a professor of laryngology to his class in order to make them realize the importance of multiple incisions in edema of the glottis. After lecturing for an hour upon the dangers of the condition and the promptness, thoroughness and extensive lancing that were necessary to bring about relief, he wound up by saying, "Cut to the right, cut to the left, cut forward, cut backward, cut upward, cut downward, but for the

love of Mike, gentlemen, cut." And so it should be in extravasation of urine.

Treatment of Stricture.—The treatment of stricture varies with the site, the kind and the extent of the stricture. No instrumentation of the urethra should be attempted, except in an emergency, until the patient has been given urotropin, santal oil or other urinary antiseptic for at least forty-eight hours. The vast majority of strictures are dilatable and even with the hard, fibrous ones, it is remarkable what can be accomplished by painstaking, gentle dilations. Elastic strictures, and the dense fibrous ones that cannot be dilated, require operation. Stricture at the meatus (a congenital small meatus) and those near the fossa navicularis must be cut. The normal meatus is 24 to 28 French. When smaller than a 24 French it may cause back pressure on the urinary tract and therefore should be cut. The operation of meatotomy should be done as follows:

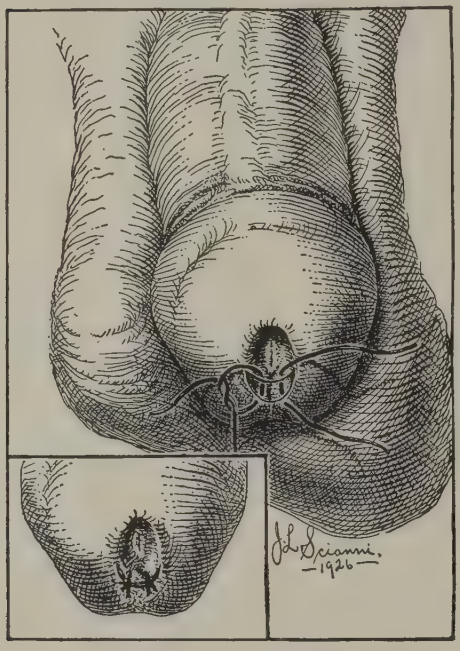

FIG. 27.—MEATOTOMY.

Floor of meatus cut longitudinally, and sutures prepared. Insert shows sutures closing denuded area by bringing horizontally the cut edge of mucosa of urethra in apposition with skin of glans penis.

Meatotomy.—After injecting novocain or alypin, 1 per cent, in the midline about the meatus and backward on the floor of the urethra, an incision is made in the midline along the floor of the urethra to a point at which the meatus will admit a 28 or 30 French sound. This is done with a pair of straight scissors. A sound is now passed to verify the size of the meatus. It is well to bear in mind the existence of postmeatal bands (bands just within the meatus, which make the caliber of the urethra smaller at this point than at the meatus). If these are not divided, the operation is futile and we fail in the very object for which the meatotomy was done, namely, drainage and the prevention of back

pressure. A small wick of gauze or a pledget of cotton saturated with mercurochrome 1 per cent or acriflavin, 1:1000, is inserted into the meatus and a light gauze dressing applied over the glans. The patient is instructed to separate the lips of the meatus at least twice a day to prevent adhesions between the cut surfaces. The objections to this procedure are hemorrhage and the healing of the incised edges followed by contraction of the resulting scar tissue. Both may be avoided by simply suturing the cut edge of the mucous membrane of the urethra and that of the glans penis on each side. Care should be taken not to make the meatus too large, for if this is done, when the patient voids, he may spray urine in every direction and have little control as to where the stream is going and ejaculation may also be feeble and unsatisfactory. Should this accident occur, the edges of the meatus may be denuded to a point where, when healed, the final opening will accommodate a 26 or 28 French sound. No. 0 plain catgut sutures are inserted and tied. The result is usually all that could be desired.

Dilatation.—Strictures of the penile urethra should be dilated if possible, but in most of the hard fibrous ones and in elastic strictures, it is necessary to cut and divide all the constricting bands. A long, narrow bistoury can be used for those near the meatus and the urethrotome for those farther down the urethra. For strictures in the bulbous and membranous urethra, dilatation should be tried, but if unsuccessful the operation of external urethrotomy is required. These operations will be described later.

Dilatation of a stricture should always be tried first, for even in the hard, fibrous variety it is remarkable what we can accomplish by gentleness and very gradual increase in the size of the dilating instruments. It is done by the passage of an instrument through the stricture in order to enlarge its caliber. We begin with the size that will readily pass beyond the stricture, and gradually increase until we have reached a 32 to 35 French.

In the strictures which will not admit small sounds, we begin with whalebone or olivary bougies until sounds can be used, and when small sounds can be passed, we may gradually increase their size until the stricture is completely dilated.

In the "filiform" strictures, that is, in strictures so tight or tortuous that only a filiform will pass, a grooved sound and guide (Gouley's) is made to thread over the filiform and thus used as a guide to get a larger instrument beyond the stricture; or filiforms are made which are attached by

screwing them to the tip of the sound (Le Fort sounds, Fig. 24, *B*), and as the filiform is pushed on through the urethra, it coils up in the bladder and the sound follows it on through the stricture, thus dilating it to the size of the sound. The attempt to pass sounds without a guide, in cases of tight strictures, is dangerous, as a false passage may be produced and extravasation of urine result. Therefore, the instrument that is least likely to produce injury is the Phillips Whip catheter, which consists of a silk woven catheter with a filiform guide attached to its tip, as in the Le Fort sounds. After the filiform has passed through the stricture, it guides the catheter and coils up in the bladder as the catheter passes through the stricture. The catheters are made in all sizes from an 8 to 36 French,

Fig. 28.—Gouley's Tunneled Sound and Guide. (Guiteras)

either attached to the filiform, or with a screw tip for the receiving threads of the filiform. Urethral dilators are most useful in dilating strictures, especially in cases with an external meatus 24 French or less. They are of two kinds, Oberlaender's and Kollmann's. Both are shaped like sounds, being made straight or with Guyon or Béniqué curves. The former have two blades and the latter four or more which may be expanded and closed by a screw on the handle, the size being registered on a dial. They are made in sizes 18 and 20 French, when closed, and may be expanded to 45 French. Therefore, the stricture must be dilated sufficiently to admit them before either can be used. The same care should be exercised as in the passage of sounds, and dilating should be done very gradually.

Dilatations should not be done oftener than once in seven to ten days, except in cases of retention, for regardless of how gently we dilate a stricture, we must traumatize the delicate urethra to some extent and some inflammatory reaction and swelling, with round-cell infiltration, is sure to result. If we dilate again before we have given the tissues time to absorb these inflammatory products, we aggravate the condition and do more harm than good, and besides, on account of the swelling, it is much more difficult and painful to pass the same instrument we had passed only a few days before.

In the "filiform" strictures it is wise to introduce four or five filiform bougies into the urethra, as it is usually easier to find the opening in the

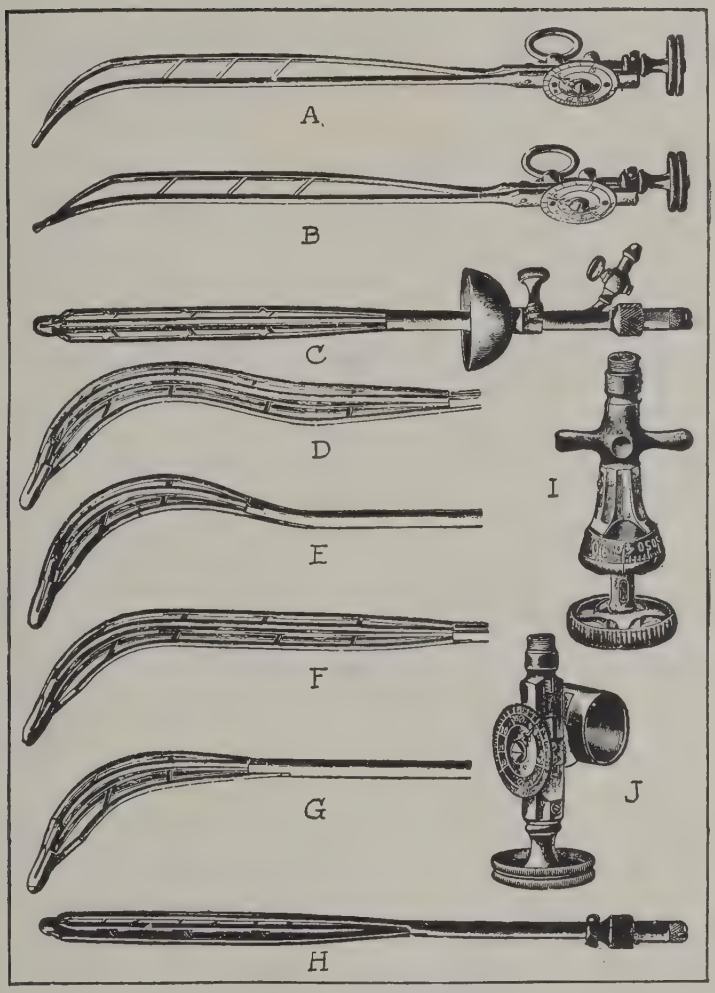

FIG. 29.—URETHRAL DILATORS.

A. Oberlaender's, Van Buren curve or Guyon.
B. Oberlaender's, long, slight curve.
C. Kollmann's, irrigating, straight, long, dilating blades.
D. Kollmann's, Béniqué curve, long, dilating blades.
E. Kollmann's, Béniqué curve, short, dilating blades.
F. Kollmann's, Guyon, curved, long, dilating blades.
G. Kollmann's, curved, short, dilating blades.
H. Kollmann's, straight, long, dilating blades.
I. Gentil-Kollmann's Universal Handle to fit the above.
J. Kollmann's Universal Handle to fit the above.

stricture with several filiforms than if we use only one. Before introducing any instrument into the urethra it is best to have the patient take a urinary antiseptic such as hexamethylenamin (urotropin), helmitol, or santal oil. The compound methylene-blue pill is also especially serviceable for this purpose. In cases of stricture, before passing a filiform or sound the penis should be cleansed, then a local anesthetic, such as alypin 2 per cent, tutocain 2 per cent, or butyn 2 per cent, should be injected gently into the urethra, first filling the anterior urethra, then waiting a few minutes until the cut-off muscle relaxes and some of the solution passes backward into the posterior urethra and bladder. Then the anterior urethra is again filled with the anesthetic and the meatus held tightly with the fingers or a penile clamp for five to fifteen minutes. Cocain should not be used in the urethra as it is very dangerous even in weak solution. Especially is this true in cases where there is any abraded surface in the mucous membrane.

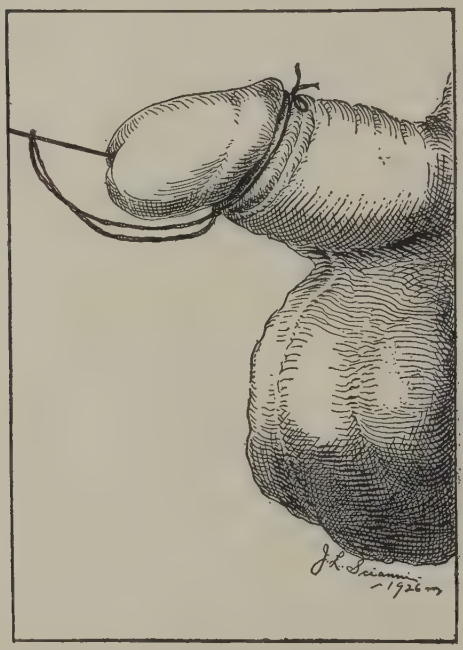

Fig. 30.—Filiform Bougie Tied in the Urethra.

After anesthetizing the urethra, the instrument is lubricated and in the urethra we inject a warm-water-soluble lubricant, such as any of the preparations now on the market. Oily substances are helpful in passing an instrument through a stricture but this help is more than counterbalanced by the danger of infection. If an oil is preferred, use gomenol oil, as this is both antiseptic and locally anesthetic. In the passage of instruments, no force should be used and bleeding should be avoided as much as possible. However, we must remember that there are usually congestion, swelling and often granulation tissue about a stricture and, hence, it is well-nigh impossible to pass any instrument without causing some bleeding, in spite of the utmost gentleness.

In tortuous strictures, it is often impossible to pass a straight filiform, therefore filiforms are made with various curves, bends and spirals to adapt themselves to the tortuosities.

In very dense and tight strictures with complete retention, we may be able to pass a filiform and then be unable to follow it with any larger instrument. In such cases, it is wise to leave the filiform in the bladder, tying it firmly to the glans penis (Fig. 30). It will then act as a continuous dilator and the urine will seep out along it and thus relieve the retention. The next day a larger instrument can be passed over the filiform and both may be removed after filling the bladder with some antiseptic and allowing the patient to void it himself. It is always important to irrigate after dilating any strictures; in fact, many authors recommend irrigating the urethra prior to dilating a stricture. In my opinion, however, this is unnecessary if the patient has been taking an antiseptic, and in addition it may increase the spasm and be the means of preventing the passage of an instrument beyond the stricture.

Electrolysis.—This has been recommended for the treatment of stricture of the urethra but has not given the author the results claimed for it. Diathermy, too, has its advocates. Corbus and O'Conor recommend that the caliber of the stricture be determined and the urethral thermophore passed. The patient lies upon an autocondensation pad and the current is turned on to effect a temperature of about 105° to 107° F. (40.5° to 41.6° C.) for twenty or thirty minutes.

If, after a fair trial with gradual dilatation, a cure is not being obtained, operation is indicated. It is far better to operate than to traumatize the urethra with repeated unsuccessful attempts to pass an instrument beyond a stricture when the stricture is posterior to the penoscrotal junction. If much trauma and hemorrhage result, even though the instrument has passed the stricture, it is safer for the patient if we do an external urethrotomy, for this affords drainage, prevents extravasation of urine and diminishes shock, toxemia and the possibility of urinary fever.

Urethrotomy from within the Urethra.—The Otis operation is suitable for those cases which can be dilated to a 15 French and located in the penile urethra and the Maisonneuve for those of smaller caliber. It can be done under local or general anesthesia. Sacral anesthesia is best but ethylene or nitrous oxid are suitable for general and alypin 2 per cent or tutocain 2 per cent for local anesthesia.

Except in emergency cases, the condition of the kidneys should always be determined by the phenolsulphonephthalein test and the blood ex-

amined for CO_2 combining power, creatinin and urea. The back pressure resulting from the obstruction caused by the stricture may have produced considerable impairment of the kidney function, hence the importance of knowing the exact amount of damage that has been done.

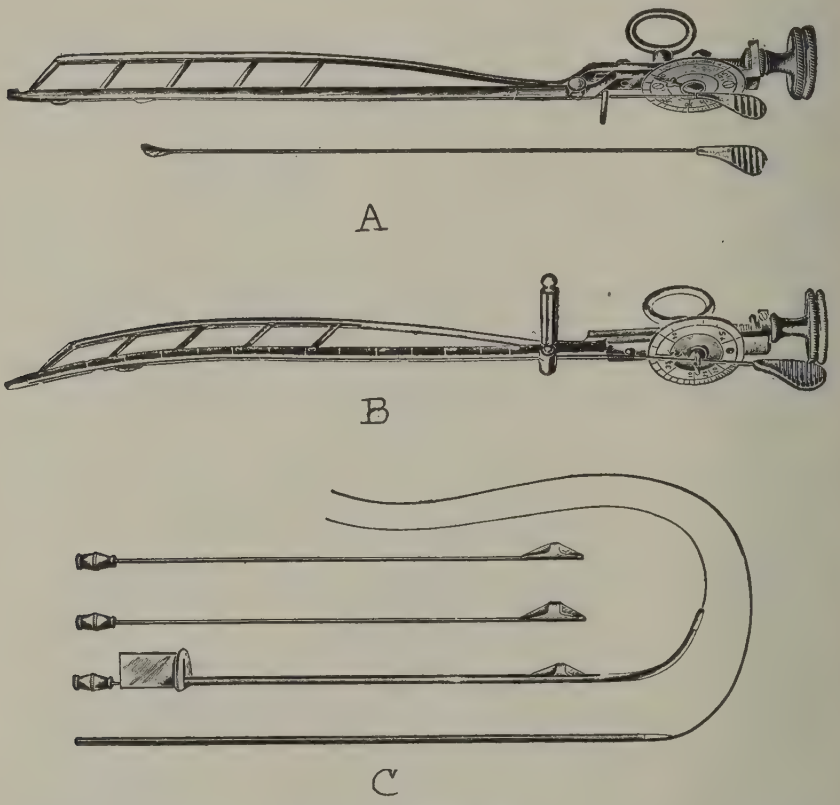

FIG. 31.—URETHROTOMES.

A. Otis' straight (or curved) with blade in exploring shield which finds stricture without measuring.
B. Otis-Wyeth's straight or curved.
C. Maisonneuve's with Cunningham safety finger guard.

The patient should be put on urotropin or santal oil for a few days prior to operation. The penis, pubes and scrotum are thoroughly cleansed as for any surgical procedure. The urethra is then filled with a 2 per cent solution of alypin and the meatus held for fifteen minutes. The caliber,

width and distance of the stricture from the external meatus are then carefully determined.

Urethrotomy with the Otis Urethrotome.—The instrument used in performing an internal urethrotomy is most frequently the Otis (Fig. 31, *A, B*). It is suitable for cases that can be dilated to 15 or 16 French. The Maisonneuve urethrotome, as modified by Thompson Walker (Fig. 31, *C*), is suitable for strictures as small as 8 French. The Maisonneuve instrument cuts the stricture from before backward, the Otis from behind forward.

When the caliber of the stricture is smaller than 8 French, it must be dilated to this size with filiforms and sounds.

Tevans' urethrotome is similar to the Maisonneuve and is suitable for any caliber stricture.

The Otis urethrotome is passed and the blade so arranged that it will begin cutting ⅛ inch behind the stricture, then through it and finally ⅛ inch in front of it. The instrument is then expanded to the maximum caliber of the stricture. With the blade held in the midline of the roof, the stricture is incised, the blade hidden and the dilatation carried to 35 French if possible. If this cannot be done, the blade should be reintroduced and the stricture again cut, care being exercised to have the blade follow in the line of the first incision. This is for the purpose of deepening it in order to sever the remaining cicatricial bands. It is now dilated to 35 French and the urethrotome removed. Sounds are then passed from external meatus to the bladder and the urethra irrigated with warm boric acid, mercurochrome 1 per cent or acriflavin, 1:10,000. A soft rubber catheter 18 French should then be introduced into the bladder through the urethra and held firmly in place by strips of adhesive plaster. The catheter may be removed in forty-eight hours and the urethra should then be irrigated again. The patient remains in bed for three days and if there are no complications, may leave the hospital on the fifth day. Urotropin, santal oil or compound methylene-blue should be continued. The patient *must* report to the physician for dilatations of the stricture once a week for four weeks,

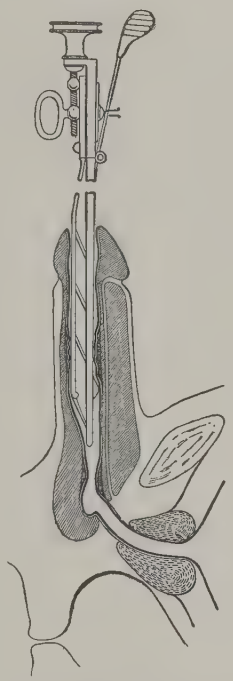

FIG. 32.—INTERNAL URETHROTOMY BY THE OTIS METHOD. (Guiteras)

then once a month for three months. Dilatation once each six months *for the remainder of life* is advisable, because once a stricture always a stricture, and by dilating it at regular intervals recontraction will be prevented.

Urethrotomy with the Maisonneuve Urethrotome.—The filiform of the Maisonneuve urethrotome is introduced through the stricture and then it is screwed to the metal guide. This is then passed on through the stricture, following the filiform, which coils up in the bladder. The urethrotome is now held in the midline by an assistant and the knife is introduced into the groove of the metal staff and by following it the blade is forced through the stricture. Care should be exercised to incise all the fibrous tissue. As the knife is withdrawn it is very important to have it pass through the incision it made on being introduced. The entire instrument is now removed and sounds are passed to 32 French to make certain that no constricting or obstructing fibrous bands are left. The after treatment is the same as after the use of the Otis urethrotome.

FIG. 33.—MAISONNEUVE'S URETHROTOME FOLLOWING ITS GUIDE INTO THE BLADDER. (Guiteras)

Complications of Internal Urethrotomy.—The complications that may result following an internal urethrotomy are hemorrhage, shock, septicemia and deformity of the penis. All can be prevented by careful attention to the details of the operations as described above. Should hemorrhage occur, it is treated by applying a moderately firm bandage about the penis and an ice-bag over the site of the incision. If this does not control it, a larger catheter coated with thromboplastin may be introduced and the bandage and ice-bag reapplied. If this fails, the catheter should be removed and a large sound introduced and left in place fifteen minutes. It should then be taken out and the catheter and bandage replaced. *Do not* use adrenalin or suprarenalin in the urethra to control hemorrhage, as a

severe reaction may result, manifested by shock, burning pain in the urethra and severe and persistent headache. A patient of mine had a severe headache that lasted for twenty-four hours following the use of adrenalin. Shock may result from any urethral manipulation and is best treated by the administration of adrenalin, 1:1000 (5 to 10 minims intravenously), cold applications to the head and elevation of the foot of the table.

Should septicemia occur, give alkalis by mouth, and 10 to 20 c.c. of 1 per cent mercurochrome in 50 per cent glucose solution, or uritone, 2 grams intravenously; water by mouth, by proctoclysis and by hypodermoclysis if necessary.

Deformity resulting in the bowing of the penis may be corrected by careful dilatation. Hot applications, gentle massage and especially diathermy are of distinct value.

External Urethrotomy.—When a stricture is situated in the bulbous or membranous urethra, external urethrotomy must be done, or internal and external urethrotomy combined. Prior to any operation or instrumentation the patient should be given urotropin or santal oil and put in the best possible physical condition by elimination and irrigation. Most cases, however, requiring external urethrotomy are emergency cases, with acute retention, and except for the administration of stimulants and one dose of urotropin by mouth, intravenously or by rectum, little else can be done prior to operation. When a filiform can be passed through the stricture, an external urethrotomy is not a difficult operation, but when the stricture is impassable it may be a very formidable one. The operation, therefore, depends upon the stricture. Consequently, when a filiform can be passed the operation is called "external urethrotomy with a guide" and when the stricture is impassable the operation is called "external urethrotomy without a guide."

Gouley's External Urethrotomy.—The patient is placed in the lithotomy position; a filiform is passed through the stricture and on into the bladder. A 20 French sound is introduced to the face of the stricture and held in the midline by an assistant. The testicles and scrotum are lifted up and the perineum exposed. An incision is made in the median raphé of the perineum, between the scrotoperineal junction and the anus, and the urethra opened on the sound. A suture of silk is inserted into each cut edge of the urethra to act as guy ropes which, when held by an assistant, make a diamond-shaped opening into the urethra, and when the sound is removed the filiform can be seen lying in the urethra and perforating the

stricture. The filiform is then held firmly with a pair of forceps at the face of the stricture and the proximal portion in the penile urethra is pulled through the incision in the urethra and brought out through the

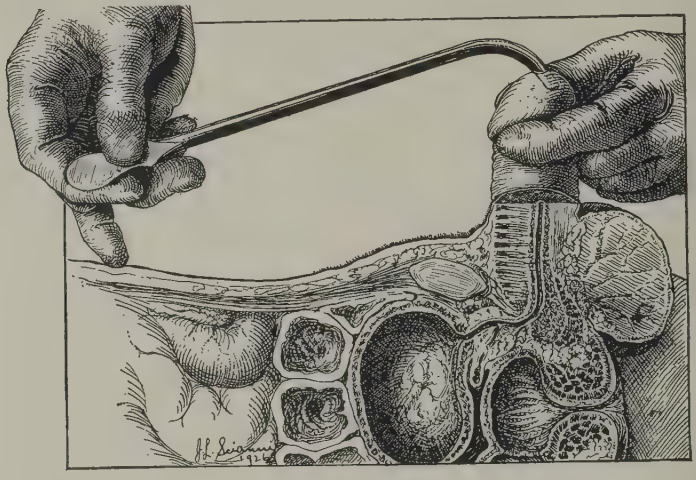

Fig. 34.—Passing a Sound. First Step.

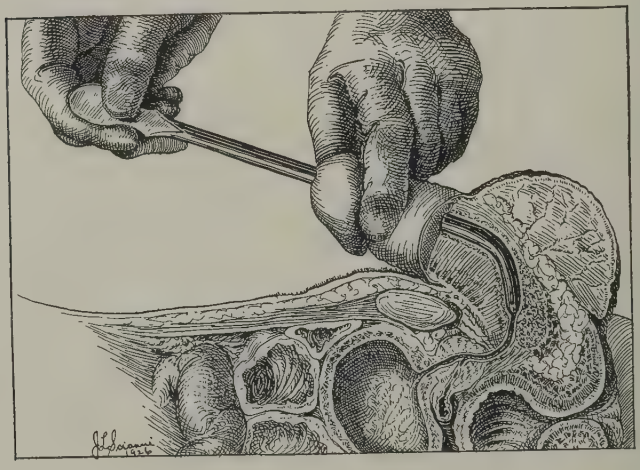

Fig. 35.—Passing a Sound. Second Step.

perineal wound. We now have one end of the filiform in the bladder and the other passing out through the stricture and hanging in the perineal wound.

A grooved director is threaded over the filiform and passed on through the stricture into the bladder. A scalpel is then placed in the groove with the edge of the blade turned upward and the roof of the stricture incised and the knife removed; the grooved director is then turned over, the knife again inserted in its groove with the edge of the blade turned downward and the floor of the stricture incised. The knife is again removed and the finger passed along the filiform through the stricture and on into the bladder where the "rubber-ring-like" grasp of the internal sphincter is felt hugging the tip of the finger. The stricture is thus dilated with the finger. We now remove the finger and pass sounds to at least 32 French from the external meatus to the bladder. The sounds are removed and then a half-inch rubber drainage tube, with two holes cut near its tip, is passed into the perineal wound, through the stricture and on into the bladder. It is held in position by two sutures of silkworm-gut passed through the skin and cut edges of the urethra and through the tube, and tied.

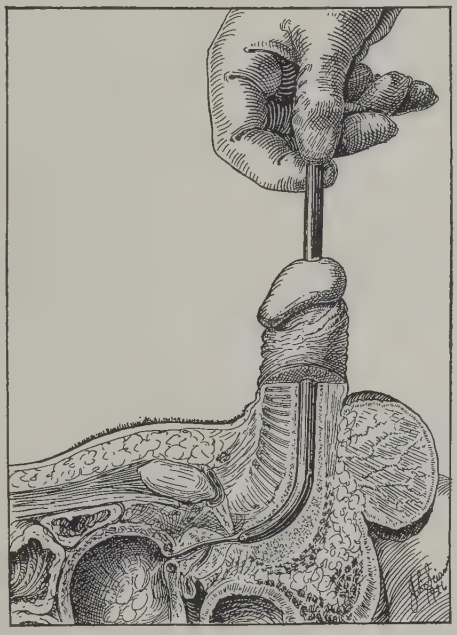

FIG. 36.—PASSING A SOUND. THIRD STEP.

If there is periurethral infection or induration, gauze should be packed about the urethra and through the tube, through the perineal wound by the side of the tube. If the perineal wound is not closed by the two sutures through the tube, as many as are necessary to close it may be introduced and tied and dressings applied. The patient is then returned to bed and the perineal tube connected with a longer tube to convey the urine to a receptacle by the side of the bed. Glucose 5 per cent and soda 2 per cent should be given by proctoclysis, or glucose 5 per cent or saline by hypodermoclysis. Urotropin, 10 grains (0.7 gram) four times a day, must be ordered given by mouth, and water at least one glass every hour. The tube should be re-

moved on the third to fifth day and sounds passed from the external meatus to the bladder on the seventh to tenth day, and once a week thereafter until the perineal wound heals; then once a month for three months, and finally twice a year for the remainder of his life.

Livermore's External Urethrotomy.—A sound is passed to the face of the stricture and the urethra opened and guy ropes inserted as above. Instead of wasting valuable time by trying to locate the opening in the stricture with a filiform or grooved director as most textbooks advise, the author places his index finger on the face of the stricture, then a knife is passed along the finger as a guide, and by pressing the knife against the stricture at the tip of the finger, the stricture is incised. The knife is then removed and by gentle pressure and rotation the finger is made to perforate the stricture and pass on into the bladder, where the rubber-ring-like grasp of the internal sphincter is felt. The other steps are exactly similar to those in the operation of external urethrotomy with a guide. If after incising the stricture the finger does not pass on into the bladder and the urethra and internal meatus cannot be readily located, it is preferable to do a retrograde catheterization, which saves time and prevents trauma to the urethra and perineal tissues. This is performed by making a suprapubic incision and opening the bladder. A small sound or probe is then passed from the bladder through the internal meatus on into the urethra. Its tip can then be felt through the perineal wound and the intervening stricture or fibrous tissue incised with a knife and the operation completed as above described.

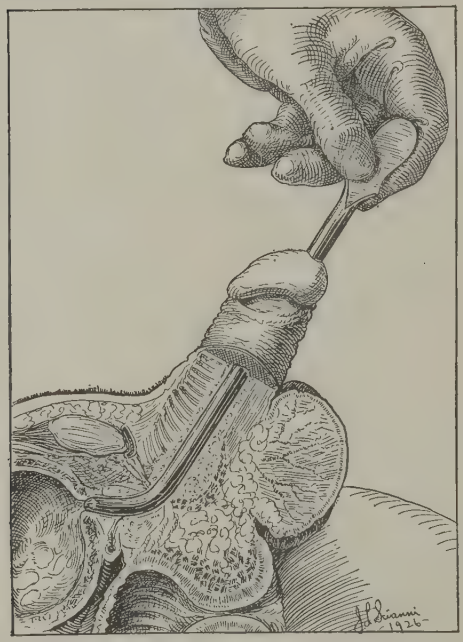

FIG. 37.—PASSING A SOUND. FOURTH STEP.

Wheelhouse Urethrotomy.—A straight metal Wheelhouse staff or sound is passed to the anterior face of the stricture and held in the mid-

line by an assistant. The incision is made in the median raphé of the perineum, opening the urethra in the groove of the staff; the cut edges of the urethral wound are retracted by silk ligatures. The staff is now withdrawn until its extremity appears in the wound. It is then turned around so that its groove points upward and the bulbous curved point is hooked over the edge of the urethral wound, retracting it upward and exposing the face of the stricture, which is examined for its opening by means of a filiform or a grooved director. When it is found, the grooved

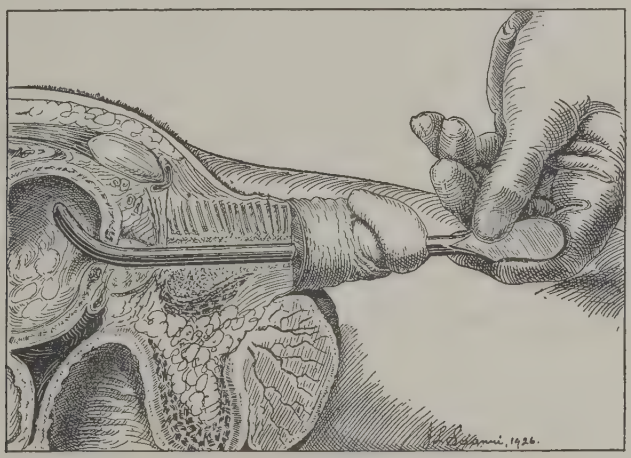

Fig. 38.—Passing a Sound. Fifth Step.

director is passed on into the bladder, the knife is then passed in the groove of the director and the roof of the stricture incised. It is then turned over and the stricture incised on its floor. The index finger is then passed on through the stricture into the bladder and the stricture and prostatic urethra dilated. A 32 to 35 French sound is passed from the external meatus to the bladder and the operation completed as above.

Some surgeons insert a retention catheter instead of a perineal tube. The cut edges of the urethra are sutured about the catheter and the perineal wound packed with gauze. This may be applicable for uncomplicated strictures, but for those with abscesses and urinary fistulæ the large perineal tube should be used.

CHAPTER VIII

METASTATIC GONORRHEA

SYSTEMIC INFECTION

The gonococcus, once having gained a foothold, may involve almost any tissue in the body. It is disseminated by the blood stream, either as a toxin which has been absorbed from a local process, or the gonococcus itself may invade the blood stream and be carried to any portion of the body. Keyes classes the lesions as follows:

Toxic lesions: Skin lesions and neuroses.

Bacterial lesions: Arthritis, osteo-arthritis, endocarditis, meningitis.

Thomson also includes under systemic gonorrhea metastatic abscesses; endocarditis, pericarditis, myocarditis, pleurisy, pneumonia, phlebitis, arterial thrombosis, periostitis, osteomyelitis, myositis, and nerve affections such as neuritis, sciatica, and paralysis, followed by atrophy of muscles.

Gonorrheal affections of the skin: Folliculitis, ulceration, exanthemata, purpura and hyperkeratosis. Gonorrheal affections of the eye: Conjunctivitis, keratitis, iritis, choroiditis and optic neuritis.

ARTHRITIS

Gonorrheal arthritis, improperly called gonorrheal rheumatism, is an inflammation of a joint or joints due to the gonococcus. It is the most frequent systemic complication of gonorrhea. Neisser and Scholtz put the frequency at 0.7 per cent of all cases. Luys says 2 per cent. It may be monarticular or polyarticular.

The gonococcus has been found and cultured from the exudate of gonorrheal joints by Bordoni-Uffreduzzi, 1894; E. Neisser, 1904; Finger, Ghon and Schlagenhaufer, 1894; Jundell, 1900; Meyer, 1903; Young, 1900; Wynne, 1905; Schultz, 1906; Thomson and many others. Mixed infections are usually rare according to Bawe, Nasse and Rindfleisch.

Etiology.—Gonorrheal arthritis is due to the involvement of a joint, or joints, by the gonococcus, which has invaded the blood stream from some local focus. It may result from any gonococcic infection, even having been observed following ophthalmia neonatorum by Hoeck, Paulsen and Brehmer, who found gonococci in the synovial fluid on culture.

It occurs more frequently in men than in women, according to Northrup about ten to one. Keyes says children are especially prone to it, but this has not been the author's experience. It may occur early or any time in the course of a gonorrhea. The author has seen a case occur in the first week of an acute anterior gonorrhea and in others in whom it occurred years after the patient thought he was cured.

Keyes says a man who has had gonorrheal arthritis will have a recurrence of it each time he has an attack of gonorrhea, unless it is immediately controlled. This has not been the author's experience, for he is inclined to believe that when gonorrhea becomes systemic, antibodies are produced and hence a certain amount of immunity is developed that rather tends to protect the patient from further invasion. He believes this is the reason why we see some results from the use of vaccines in systemic gonorrhea, while we get none from their use when it is confined to the urethra.

Injury to a joint may predispose to gonorrheal arthritis. The knee is the most frequently involved, the ankle next, then the wrist, next the elbow, next the hip and shoulder, then the hand, and lastly, the spine.

Pathology.—The lesion is a serous or a seropurulent synovitis. There may also be involvement of the bone and in rare cases the formation of an abscess.

Symptoms.—These may be severe with sudden onset and consist of chills, fever, moderate sweats and general malaise. The joint involved becomes red, swollen, tender and painful, especially on motion. There is an increase in the synovial fluid as indicated by the swelling, sense of fullness and fluctuation over the joint. There may be some sweating but not the profuse drenching sweats of acute articular rheumatism. The fever rarely goes above 102.5° F. in contradistinction to the high fever of acute articular rheumatism, but should pus develop in the joint, there may be all the symptoms of infection, such as chills, high fever, sweats, high leukocyte and polymorphonuclear percentage.

In the milder cases there may be some pain, stiffness and swelling in the joint with little or no fever.

Diagnosis.—The diagnosis is made by the symptoms, by the history, by finding the gonorrheal focus and by the complement fixation test. It is also possible for a patient to have acute articular rheumatism and gonorrhea at the same time. The absence of drenching sweats and the lower fever usually differentiate it from the acute articular form.

Prognosis.—The prognosis should be very guarded. Most cases run a long tedious course. Frequently a patient may think he is about well, when suddenly another joint will become involved. The author has seen cases (ankle and knee) in which a patient was able to walk with a slight limp in three weeks, but the better average is two months and the joint will not be restored to normal for several months longer. If suppuration occurs, permanent damage with complete or partial ankylosis may result.

Complications.—Bursitis, tenosynovitis and myositis. Any bursa may become involved but the one most frequently affected is the bursa between the os calcis and the tendo achillis. Tenosynovitis usually involves the extensor tendons of the hand and foot. Myositis manifests itself as an ache in the lumbar muscles, stiffness and pain in the posterior cervical group or as an ache or contracting pain in the muscles of the calf of the leg.

Treatment.—The treatment consists in putting the patient to bed, immobilizing the affected joint or joints, building up his resistance and eradicating the gonorrheal focus.

The first and second are, in the acute type, very easy, as these patients are so sick and suffering—the slightest motion in the joint being agony—they are only too willing to lie quietly in bed and have the joint splinted in order to prevent motion. Do not keep it in one position longer than forty-eight hours as the danger of ankylosis is proportionate to the time it is kept in one position, and the destruction of the articular surfaces of the joint and the synovial membrane. In my hands nothing has given such immediate relief of pain and suffering as typhoid vaccine intravenously. It is given in 1 minim doses in 9 minims of saline. If the patient is weak or has a cardiac lesion, it is best to give only one-half this dose, as there is usually a marked reaction following this procedure, which is manifested by a severe rigor, sometimes lasting thirty minutes or more, and followed by high fever, rapid and often a weak pulse, delirium and profuse sweats. If there is no benefit in twenty-four hours and the reaction has not been severe, I give 2 minims of vaccine in 8 minims of saline. Heat and diathermy aid in relieving the pain and swelling, and Bier's hyperemia may assist in controlling the inflammation and promoting resolution.

Gonococcic vaccine in 0.25 c.c. dosage subcutaneously and increased

every four days by 0.25 c.c. until a reaction occurs, sometimes helps and should at least be given a trial if there is no benefit from the typhoid vaccine. Young recommends mercurochrome, 5 milligrams per kilogram of body weight, intravenously.

Every effort should be made to eradicate the gonorrheal focus and where the seminal vesicles are involved, especially in those cases that do not respond to intravenous vaccine, vasotomy with injection of the vas with argyrol 20 per cent, mercurochrome 1 to 2 per cent, or iodized oil, according to the method of Belfield will often help wonderfully. Keyes recommends immobilization by plaster of Paris bandages to be left on for two weeks. The author believes this to be too long, for in two weeks exudative changes and inflammatory thickening have occurred that make the restoration of function and absorption of inflammation a tedious and difficult matter. By changing the position of the joint every forty-eight hours, the organization of the inflammation is not allowed to take place and by putting on lighter dressings, heat and diathermy can be used to promote relief of pain and absorption of inflammation. I do not use plaster bandages at all and I am sure that except for the relief of pain from immobilization they are conducive to the production of ankylosis and are the means of prolonging the morbidity. When suppuration occurs, arthrotomy is indicated, evacuation of the pus, drainage and frequent change of position. If there is destruction of the articular surfaces of the synovial membrane, a resection or some plastic operation may be necessary later. Walther advocates aspiration of the joint and injects Murphy's formalin solution, and in the cases where the seminal vesicles are involved, advises vesiculotomy.

Rosch, 1916, treated over two hundred cases with salicylates, moist dressings and light massage and said one-half of his cases were cured in less than two months and only fourteen required three months' treatment. In the author's personal experience, salicylates have proved of little value and they are prone to cause digestive disturbance.

Thomson says vaccine therapy is without doubt the most reliable treatment. He says he has had very excellent results with detoxicated gonococcic vaccine and that many cases clear up in three weeks or less with this treatment alone. In my experience, gonococcic vaccine has not given me the results claimed by others. I am more in accord with Keyes who says, "I have had little luck with it though I have used everything I could lay my hands on from horse serum to typhoid vaccine." Although I have

seen cases where I thought gonococcic vaccine in increasing doses was probably beneficial, I have had no experience with the detoxicated vaccine of Thomson.

EXOSTOSIS OF THE OS CALCIS

The so-called gonorrheal spur was first described in 1906 by Baer. According to him there is first an acute inflammatory process in the flexor brevis digitorum at its attachment to the os calcis which then extended to the bone. Later, exostoses develop on the os calcis due to the chronic inflammation of the periosteum. The chief symptom is pain on pressure or motion. The bony projection can be palpated and seen on an x-ray plate. Winthrop reported two cases in 1909 and says it is probably not uncommon and that the chief symptom, pain under the heel, is usually ascribed to flat-foot, bursitis or rheumatoid arthritis.

Cases are also reported by Jaeger, Davidson, 1908, and Merritt, 1908.

In most cases there is a history of gonorrhea and very severe pain. The x-ray shows a characteristic bony growth. The prognosis is good but a cure is obtained only by operation.

Treatment.—The treatment is operative and consists in chiseling off the exostoses.

OSTEOMYELITIS

Gonorrheal osteomyelitis has been reported by Ullmann, 1900; Heyman, 1900; Cupler, 1907; and Watts, 1911. Gonococci were found in the pus from the marrow and joint cavities. It is a very rare condition. The author has never seen a case.

CHAPTER IX

CHANCROID AND VERRUCA ACUMINATA

CHANCROID

Definition.—Chancroid is an ulcerative process usually involving the external genitalia, but also occurring on any part of the body.

It is a purely local disease, affecting only the portion of the body involved and the lymphatics and lymph-nodes in anatomical relation with it. It is auto-inoculable and spreads rapidly.

Etiology.—It is usually contracted during sexual intercourse, but may develop when the discharge from the ulcer, containing the specific infection, streptobacillus of Ducrey and Unna, is deposited on an abraded surface by some intermediary object, such as the fingers, dressings, towels, or instruments. Filth and uncleanly habits predispose to this infection; and phimosis or a tight foreskin, by preventing proper cleansing of the parts, are factors in the contraction of chancroid.

Race is also a factor, according to Corbus (Cabot, *Urology,* 1924), the Negro being particularly susceptible. It is also the author's observation that it is particularly prevalent among Negroes, but this is due, in his opinion, to the uncleanly habits of this race.

The exciting cause is the streptobacillus of Ducrey and Unna. This is a small bacillus which is found arranged in chains both intracellular and extracellular. It may also be arranged in chainlike groups and is easily stained with methylene-blue or carbolfuchsin. It is decolorized by Gram's method. The finding of the streptobacillus is often difficult because of contamination with other bacteria, but if the chancroid is covered with collodion for twenty-four hours, the other organisms are destroyed, and the streptobacillus is then easily demonstrated.

Location.—In Fournier's group of 445 cases, the prepuce and glans penis were the seats of chancroid in 347; the penis in 71; the scrotum and pubes in 6, and the remaining 21 in other portions of the body.

Symptoms.—It is said that there is no definite incubation period, but in the author's experience it usually develops in from five to seven days

and it may be put down as a general rule (by no means infallible) that an ulcer developing after ten days is not a chancroid.

It usually begins as a small papule which rapidly becomes a pustule. This ruptures, leaving a deep ulcer, or it dries to a yellowish or brownish crust which falls off, leaving an ulcer as above. This appears sloughy with undermined edges, and rather profuse, purulent discharge. It has a rather foul, characteristic odor. It is usually quite painful, thus differing from chancre, but this is also not infallible, and it must be remembered that both chancroid and syphilitic infection may be present at the same time, or chancroid may develop first to be followed later by chancre.

Chancroid may be single or multiple, usually the latter. Surrounding the ulcer there may be an area of congestion and edema, and red streaks (lymphangitis) may radiate from it along the penis. The inguinal lymph-nodes may become swollen and painful and later break down to form a bubo. When situated on the frenum the ulcer soon perforates it and finally severs it completely. When other infection develops and the congestion, edema, lymphangitis and discharge increase in severity, chancroid spreads rapidly in all directions, or may spread at one side and show some tendency to heal at another. It may become gangrenous and slough, forming the so-called phagedenic chancroid, which is often very difficult to cure.

A cure usually results in from two to six weeks, though some chancroids resist all treatments for months.

Diagnosis.—This is made by finding the streptobacillus of Ducrey and Unna, the history, the symptoms, the appearance of the ulcer and the failure to find the *Spirochæta pallida* (*Treponema pallidum*). Regardless of the appearance, history and failure to find spirochetes, one must be guarded in making a positive diagnosis of chancroid. The old three-column table noting the special characteristics of chancre, chancroid and herpes is valuable only to warn us not to be governed by it. Often the hard, indurated, more or less superficial ulcer may prove to be a chancroid which has been given the characteristics of a chancre by repeated caustic applications, while the small insignificant pustule which appears as an innocent, simple, infected skin follicle, may prove to be a chancre.

It is our rule to examine daily for three days for spirochetes and Ducrey-Unna bacilli, applying only sterile saline or collodion to the ulcer during this period. Failing to find spirochetes, but seeing Ducrey-Unna bacilli in some cases, none in others, we make a tentative diagnosis of chancroid and then apply chancroidal treatment. Should the ulcer heal, we

direct the patient to return for a Wassermann in three weeks and again in two months, or sooner if a rash appears on the body or an ulcer in the mouth or throat.

In differentiating chancroid from herpes, the latter appears as a crop or successive crops of vesicles, usually accompanied or preceded by itching. These soon rupture, leaving an abraded weeping area. As it dries, a crust forms, which heals promptly if kept dry or painted with collodion.

Treatment.—When chancroid develops on the glans penis in a case of phimosis or under a tight foreskin where the swelling and edema soon produce a phimosis, it is absolutely necessary to expose the chancroid to avoid destruction of the glans. This exposure is accomplished by making a dorsal slit in the foreskin, or better still a bilateral slit, suturing the skin and mucosa of each cut edge together. The chancroid is then treated as described later, and a wet dressing of 5 per cent mercurochrome or acriflavin, 1:1000, applied and kept saturated with the same. Regardless of the care and antiseptics used, the cut edges will become infected with chancroid, are exquisitely tender and extremely difficult to control.

The cautery circumcision as performed by Morgan, Duncan and Hennessey, and thorough destruction of the chancroid by the cautery usually results in lessening infection and hastening a cure, and has proved far more satisfactory in our clinic at the Memphis General Hospital than the dorsal or bilateral slit.

Prophylactic.—The only certain prophylactic is to avoid contact with chancroidal infection by abstaining from illicit intercourse. The condom, though protective, is not infallible, but thorough cleansing with soap and warm water followed by a solution of mercuric chlorid, 1:5000, and then applying calomel ointment 33.3 per cent in vaselin for eight to twelve hours, may prove a satisfactory preventive.

Curative.—The best treatment when the diagnosis of chancroid has been made, is to wipe away the discharge and loose slough from the ulcer, then apply alypin or novocain crystals, wait five minutes, then cleanse the chancroid with cotton swabs and apply 25 per cent copper sulphate; then spark the ulcer with the high frequency current using a small glass vacuum electrode, after the method of Robbins and Seabury. This has proved to be most effective and failures may be attributed to inadequate application of the high frequency current; for every portion of the chancroid must be carefully sparked while covered with a layer of copper sulphate, 25 per cent solution.

Some years ago the author suggested the use of silvol crystals as a

cure for chancroid, and he still uses them with marked success, especially following the application of copper sulphate and the high frequency current. Argyrol crystals, as suggested by Pendergrast, may be used instead of silvol crystals. The chancroid should be cleansed thoroughly, then the crystals of silvol or argyrol applied. It is then dressed with gauze and not disturbed till the next day. If at the first dressing the ulcer looks sloughy and seems to be spreading, the copper sulphate and high frequency current should be used. If, however, it is improving, a second application of silvol is made and its use continued until all sloughing or tendency to spread has disappeared and a healthy granulating area is produced. At this stage, any good antiseptic, such as mercurochrome, acriflavin, etc., will complete the cure.

Cauterization of the chancroid with nitric acid has its advocates, but to be effective it must be thorough. The chancroid should be anesthetized by applying alypin or novocain or by injecting a 1 per cent solution of either about the base. Carbolic acid is first applied, according to Watson and Cunningham quoting Taylor, followed by the nitric acid. The carbolic, being somewhat anesthetic, diminishes the pain, but should not be relied upon alone, as it is escharotic to the superficial tissues, forming a crust that prevents destruction of the infection beneath. When a chancroid has perforated the frenum, the frenum should be severed with knife or scissors in order that proper treatment may be applied.

In the phagedenic type, after using copper sulphate and the high frequency current, powdered iodoform is dusted on the chancroid then covered with gauze and a constant drip of Ochsner's solution (alcohol, 1 part; 5 per cent carbolic acid, 1 part; saturated solution of boric acid, 6 parts) is applied. The gauze dressing is to be changed frequently and more iodoform dusted on at each change. Iodoform is a splendid remedy for chancroid, but on account of its penetrating, disagreeable and telltale odor, has been discarded, especially since the effective high frequency and copper sulphate treatment has been discovered. Should this fail to control, the actual cautery should be used. Stimulants and tonics should also be used to build up the patient's resistance.

Such dusting powders as aristol, boric acid, bismuth-formic-iodid, etc., are worthless, and in fact are decidedly harmful, as they act as a protective covering for the infection, giving it full play to spread rapidly underneath. Their use should be confined to a healthy granulating surface after the chancroidal infection has been destroyed. Cauterization of a chancroid may be carried out by applying zinc chlorid pulp as advocated

by Morton. It is prepared by adding a few drops of water to zinc chlorid. After twelve hours, hot packs loosen the crust, which comes off, leaving a healthy granulating surface, which may be dressed with any good antiseptic. Cumerin, 2 grains to the ounce, is said to disguise the odor of iodoform, but is not very effective. In Lewin's Clinic in Germany an ointment composed of silver nitrate, 1 part, balsam of peru, 10 parts and petrolatum, 89 parts was used with success after the chancroidal infection had been eradicated.

Morton gives the following contra-indications for cauterization:

1. Excessive inflammation and edema.
2. Presence of inguinal adenitis.
3. When the chancroid is healing and beginning to cicatrize.
4. Never cauterize part of a chancroid or one or two when there are several.
5. When the chancroid is in the meatus or urethra.

There is no contra-indication to the use of the copper sulphate and high frequency method, except (4), and the latter part of (5), "when the chancroid is in the urethra."

Iodoform powder and boric acid, equal parts, blown into the urethra or applied through the endoscope, is best for urethral chancroid.

Complications.—*Lymphangitis.*—This usually accompanies every chancroid but quickly subsides, as a rule, following the copper sulphate and high frequency treatment. Should it not do so, lead and opium lotion or aluminum acetate solution may be applied.

Inguinal Adenitis and Bubo.—Inguinal adenitis is a frequent complication of chancroid. It usually is unilateral but may be bilateral.

Symptoms.—One or more nodes may become enlarged, tender and painful and the skin over them may be reddened. The node is firm and indurated at the onset, one or more being involved. When several are affected they may soon coalesce forming a large indurated, reddened, painful mass, which may later break down and become soft and fluctuating. The patient, may have a temperature of 99° to 101° F., and when the bubo develops there may be a chill followed by a rise of temperature to 103° to 104° F. There will also be a leukocytosis and an increase in the polymorphonuclear percentage. A chancroid may heal before an adenitis or bubo develops.

The diagnosis is made by the appearance of the swollen nodes, the presence or absence of fluctuation and the symptoms.

Treatment.—In the early stage when there is only an adenitis, a bubo may be prevented by the application of compound iodin ointment or ichthyol 50 per cent in vaselin with a tight spica flannel bandage. An ice-bag placed over the dressing may help, or Bier's hyperemic treatment may cause resolution. Should an abscess (bubo) develop, the Hayden Helm Iodoform Ointment operation should be done (see page 71), or the bubo may be lanced, cleansed, packed with iodoform gauze and the dressings kept wet with Ochsner's solution.

It is a fact that when these buboes are opened they usually break down forming a large ulcerating chancroid, which should be treated with copper sulphate solution and the high frequency current. Should sloughing occur, thorough cauterization with actual cautery under anesthesia, followed by constant wet antiseptic dressings, iodoform and Ochsner's solution being especially good.

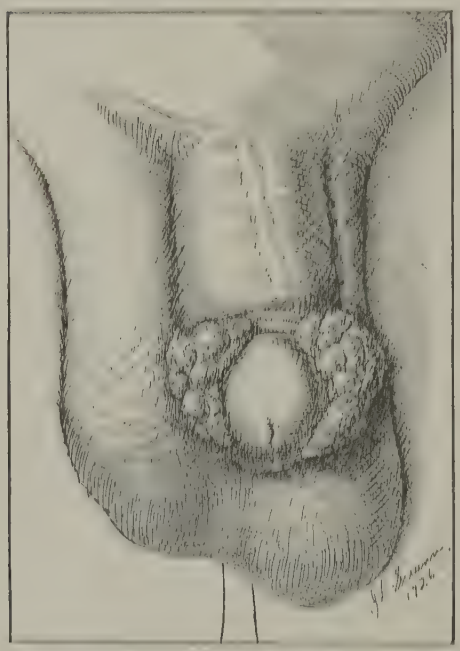

Fig. 39.—Papillomata, Venereal Warts.

PAPILLOMATA, VERRUCA ACUMINATA OR VENEREAL WARTS

Incidence.—Papillomata of the penis are very common, but as they often occur in individuals who are not afflicted with any venereal disease, the name venereal warts is not always applicable. They are an overgrowth of the papillary layer of the mucous membrane or skin. They may be single or multiple, usually the latter, and frequently involve extensive areas. They occur usually in the coronal groove or on the glans penis, but may occur on the skin or mucous surface of the prepuce or on the skin of the penis or scrotum, on the vulva and even about the anus and in the urethra.

Etiology. They occur as the result of irritation, or inflammation especially in cases with purulent discharge (gonorrhea) and tight foreskins.

Diagnosis.—They are usually so characteristic, the diagnosis is easily made, although they may be confused with condylomata lata or epithelioma. Other symptoms of syphilis and a Wassermann will differentiate them from the former, and a microscopical examination from the latter.

Prognosis.—There is some tendency to malignant degeneration in patients past forty.

Treatment.—If relieved of the irritation (circumcision, cleanliness) and kept clean and dry they may disappear spontaneously. In the hands of the author, fulguration is the best method of treatment. Excision is also very satisfactory. When the meatus or frenum is involved, we should be careful not to leave too large a denuded area for fear of cicatricial contraction of the resulting scar. The bases should be curetted, touched with nitric acid and dressed with 2 per cent mercurochrome or acriflavin, 1 : 1000, and later a dusting powder applied. Keyes says the most valuable local application is a 10 per cent mixture of salicylic acid in acetic acid (not glacial acetic acid). One or two applications cause the warts to wither away and drop off. Keyes also recommends x ray and radium.

PART II

GONORRHEA IN THE FEMALE AND THE INFECTIOUS GRANULOMATA

CHAPTER X

GENERAL CONSIDERATIONS AND ETIOLOGY

Among the diseases affecting women, three stand out as being responsible for more destruction of female life and a greater morbidity than all the rest combined.

These three are carcinoma, gonorrhea and pelvic infection the result of abortion. Gonorrhea easily heads the list as a cause of ill health and invalidism, while happily being far less responsible for loss of life than the other two.

The gravest phase of the gonorrhea question, however, is that of sterility, since this disease accounts for by far the greatest number of sterile marriages.

When to these indictments one adds the facts that diagnosis is frequently attended with great difficulty, and that treatment is still in a most unsatisfactory state, no real specific plan of attack having as yet evolved, it seems superfluous to stress the necessity for the most painstaking study of the disease and the most unremitting prophylaxis against its continued wide distribution.

PATHOLOGY AND CLINICAL PICTURE

Modes of Infection.—Gonorrhea is an infectious disease transmitted by the direct inoculation of the columnar epithelium of the sexual organs with the specific organism, the diplococcus of Neisser. The vast majority of cases among adults occur as a result of sexual intercourse, though the disease may be acquired by contact of the susceptible structures with infected clothing, toilet seats, etc., as has been substantiated by a rather abundant literature. Such method of transmission is extremely rare, however, since the gonococcus is an organism which perishes within a few hours when exposed to drying or to room temperature. In order to be actively infective, the cocci must be inoculated upon columnar epithelium in a wet state. Norris says that men have been infected by the use of secondhand condoms and that hand infection is not unknown. Unclean

instruments and a break in aseptic technic during pelvic examination, or local treatment, may also be responsible for a small number of cases.

The infection is at first merely a surface inflammation, the bacteria then invading the underlying structures to a greater or less degree, dependent upon the nature of the tissue involved.

The number of gonococci necessary to transmit the disease is extremely small, and the experiments of Werth and others show that the number of organisms gaining access to the infective field is of no importance. It is not necessary that the mucosa be abraded nor is any injury necessary to secure inoculation.

The period of incubation of the disease is short. In several series of case analyses (Eisenmann, Hocker and Hoelder, Lanz, Keyes, quoted by Norris) it was found that the commonest period of incubation was three days, symptoms developing usually on the third day after infection.

More than two-thirds of the cases developed within the first week and an incubation period of more than ten days is extremely rare.

The period of incubation is of considerable diagnostic importance, since traumatic or other irritations and inflammations will present themselves a few hours after the contact with the irritating agent, whereas the gonococcal infection usually requires more than twenty-four hours to make itself apparent.

Gonorrhea is essentially an ascending infection, having its inception either in the urethra, Bartholin's glands or the cervix, later infecting the endometrium, fallopian tubes and the pelvic peritoneum. The organisms are brought into contact with the tissues at coitus, by means of the seminal fluid, and the acute inflammation of the lower genitalia is brought about by direct inoculation.

The ascent of the cocci, which are non-motile, against the ciliary current, is made possible, it would seem, by renewed coitus, the organisms being carried directly into the uterus by the much larger and highly motile spermatozoa.

Also there is a current, inaugurated by the upward movement of many spermatozoa, which directs the fluids of the uterine mucosa against the downward ciliary wave and carries many gonococci upward with it.

Infection of the female genitalia by the gonococcus implies that any or all of the anatomical divisions of these structures may be invaded, it being frequently demonstrated that the disease attacks one or possibly two of these organs primarily, and then spreads from less resistant to more resistant tissue by continuity.

The urethra and the cervix uteri are the most frequent seats of a primary infection, the vestibular glands (Bartholin's), the endometrium, the tubes, and the vagina, following in the order named.

The urethra is most commonly the primary focus when the woman is nulliparous or unmarried, since the contracted vaginal orifice causes the germs to come into direct contact with the meatus at the very beginning of coitus. On the other hand, in vaginas relaxed as a result of repeated parturition or a long married life, the male organ enters directly, without coming into contact with the urethra, and the cervix is the point of attack by the pathogenic organisms.

One or both of these two areas is almost always the site of the primary infection.

The initial inflammation is always superficial, the organisms limiting their activity to the epithelium and the subepithelial tissues. As time goes on, profound and chronic changes are produced in the underlying structures. Dense round-cell infiltration with connective tissue hyperplasia and severe cicatrization are usually found.

The gonococci may lie dormant in such tissues for long periods of time, to be excited into renewed activity by the congestion and traumatism of labor or abortion, by sexual excesses, or by the invasion of the tissues by other pyogenic bacteria. However, prolonged encapsulation tends to destroy the organisms, and the pus from cases of long-existing salpingitis is usually sterile. The gonococcus does not readily affect or penetrate adult squamous epithelium, as that of the vagina, but true mucosa furnishes fertile soil for its propagation. The cells become swollen, exfoliated and replaced by a sort of squamous epithelium or cicatricial tissue. The organisms then gain access to the neighboring glands and cause glandular and periglandular inflammation, frequently with abscess formation. Eventually the muscular layers and even the serosa of the various invaded organs are attacked, with the resultant connective tissue overgrowth and scar tissue formation already alluded to.

Norris well says that this tendency to scar formation is responsible for many more instances of pelvic inflammatory disease requiring operative interference than would otherwise be the case. In other words, many old chronic cases suffer more markedly from adhesions and contractions than from the actual bacterial inflammation, but this, of course, does not apply to the many cases that exhibit more or less frequent or prolonged exacerbations.

Finally, the tendency of the gonococci to remain latent for long periods is a feature peculiar to the disease.

These organisms lie embedded beneath the mucosa and in the depths of glands, and a gonorrheic woman may cohabit with a man indefinitely and not produce an infection until, as a result of some excess or traumatism, the bacteria are rendered active, reach the surface and cause infection in the partner, for which it is necessary that the gonococci be brought into direct contact with mucous membranes.

It has been shown that reinfection may and does frequently occur, a new strain of organisms being implanted upon tissues which have already suffered from the disease. Such secondary attacks are apt to be shorter and milder than the original ones, although they are more apt to be complicated by the remote lesions of this infection, as arthritis, endocervicitis, etc.

As in other expressions of bacterial activity, the virulence of various strains of gonococci varies greatly, one strain causing severe metastatic lesions in a large number of persons inoculated with it, while another will produce mild attacks of sharp localization and short duration.

The great outstanding characteristic of gonorrhea is its tendency to chronicity, which has led to the pessimistic view that once acquired the disease is practically ineradicable. "Once infected, always infected," said Noeggerath; and again: "All attacks of gonorrhea are curable except the first."

These statements, happily, are somewhat exaggerated, although the results of even the most painstaking treatment, with the full coöperation of patient and physician, are all too often attended by complete failure to effect a permanent cure.

CHAPTER XI

DIAGNOSIS

GENERAL CONSIDERATIONS

It has previously been stated that, with the exception of certain instances of tubal or parametrial involvement, gonorrhea in women is symptomatically a very mild disease. The urethritis which is so often the first result of infection very rarely gives rise to distress sufficient to cause the woman to seek medical aid. This is also true of the so common endocervicitis and vaginitis.

Indeed, the vast majority of female gonorrheics consult a physician for one of two reasons: Either they have cause to suspect a husband or lover of having acquired the disease and transmitted it to them, or they come for the relief of a painless but intractable leukorrhea. Salpingitis with its attendant pelvic pain, dragging backache, irregular menstruation and profuse leukorrhea, brings the larger minority to the care of a medical man, while abscess of Bartholin's gland and condylomata are the predominant lesions in but a very few women.

In developing the diagnosis in these cases the factors of first importance are a most detailed history of the condition together with painstaking and often repeated bacteriological studies. In a general way it may be said that definite physical findings in female gonorrhea are notably absent and only in the purulent phases of salpingitis, parametritis or bartholinitis, do such definite physical findings present themselves.

HISTORY OF THE CASE

In addition to the usual details of the patient's past life, especial attention must be devoted to the facts concerned with the onset of the trouble for which relief is sought. Indisposition, even slight, immediately following marriage, is extremely significant of a marital infection. The so-common history of some burning and discomfort in the pelvic organs with frequency of micturition in the weeks following marriage, is ordinarily the story of the onset of an acute gonorrhea. The symptoms soon

subside and are followed by a chronic leukorrhea, the discharge being described as thick, whitish-yellow, sometimes greenish from mixed infection with the *Bacillus pyocyaneus,* though it may appear as a watery fluid and attended by no pain. Such women are frequently sterile, and ascribe their condition to the profuse and continued vaginal discharge.

In other cases the leukorrhea will be found to have begun without any definite focus of discomfort, the discharge simply having appeared without demonstrable cause and continuing indefinitely.

When the vaginal discharge follows upon abortion, parturition, or a general illness, as typhoid fever, one may reasonably conclude that gonorrhea is not a factor except as it may occur as an incidental coinfection.

The same principles apply to a history of pelvic pain. Salpingitis with its fever, slight nausea and vomiting and moderate evidence of peritoneal irritation, may follow abortion or childbirth, with this condition as sufficient explanation for its occurrence. But should the evidences of salpingitis present themselves without the foregoing definite causal factors being present, the disease is usually due to neisserian infection.

It may be stated, then, that a history of pelvic inflammatory disease, no matter how mild or how severe, occurring without the presence of abortion, parturition or acute systemic infection, is probably due to the gonococcus.

Again, careful questioning of the patient may elicit an account of one or more attacks of acute pain about the vulva with swelling, and later rupture of a small abscess with purulent discharge and immediate relief from pain. Such history is extremely suggestive of bartholinian abscess and is strongly corroborative of the presence of gonorrheal infection.

The social history is also quite significant. Women of loose habits, those who speak of separation shortly after marriage by reason of the misconduct of their husbands, or those who are wives of sporting men may justly be suspected of being victims of specific infection when they present themselves complaining of any of the conditions just described.

The menstrual history should be obtained in detail.

The occurrence of any of the complications or sequelæ of gonorrhea, not only in the patient herself but in her husband if she be married, must be carefully sought. Acute endocarditis, single joint arthritis, and urinary disorders are of course strong links in the chain of evidence that prove the presence of gonorrhea.

Physical Examination.—The general physical findings should be carefully studied, before a diagnosis of disease is made. In the matter of gonorrhea, there are many factors, for and against, which are disclosed by careful general investigation. Thus, a woman who presents scars suggestive of syphilitic lesions of the extremities is more apt to be a victim of neisserian infection than she who has never suffered from venereal disease. Foci of active pulmonary tuberculosis lead to the suspicion that the pelvic symptoms complained of may be due to genital tuberculosis rather than gonorrhea. Furthermore, leukorrhea being a symptom both of local inflammation and systemic debility, may well result from an anemia following one of the acute respiratory infections, and have no venereal basis whatever.

Lastly, the careful general examination engenders confidence in the patient and leads her to vouchsafe possible intimate details of her life and character, which may help the examining physician to determine the diagnosis.

Pelvic Examination.—The usual precautions with regard to having a third person present when a patient is subjected to gynecologic examination are most important in venereal cases. When an office nurse is employed the problem solves itself, but in the absence of such nurse, the patient should be instructed to report accompanied by a member of her family or a friend.

The bowels should be empty and no douche should have been taken for at least twenty-four hours.

The patient should be instructed not to urinate for three hours before examination, in order that bacteria about the meatus and about the orifice of Skene's glands be not washed away.

Obviously the clothing should be loosened and the corsets removed.

Any type of examining table may be used, provided it is supplied with stirrups or foot rests so that a clear view of the genitalia is obtainable. Bright light is an essential, and either a pocket flash light or a condensing lens lamp should be available for adequate illumination of the field of examination.

The ordinary gynecological drape should be adjusted, care being taken to avoid unnecessary exposure.

The patient is placed in the position for examination most convenient for the examiner, the dorsal or modified lithotomy position being the best and most convenient for general use. The buttocks are brought well to the edge of the table, the feet resting on the stirrups and the knees

widely separated. Strong light is then thrown upon the external genitalia to facilitate detailed inspection.

Instruments.—Very few appliances are required for the gynecologic examination with reference to gonorrhea.

Rubber gloves, a Sims speculum, several sizes of bivalve specula, a wire distending speculum, long forceps, a tenaculum forceps, cotton swabs on wooden applicators, a platinum loop and a little flat steel spud such as oculists use, together with cover-glasses, glass slides and a culture tube or two, comprise the entire armamentarium.

A cystoscope for bladder examination and a proctoscope for rectal exploration may be required in exceptional cases, with some form of apparatus for determining the patency of the fallopian tubes, by the Rubin test in those cases where sterility is a factor.

Material for smears is much better obtained with the steel spud or the platinum loop than with cotton swabs, since so large a part of the cellular matter remains entangled in the cotton while the smear consists largely of serum (Van Gusen).

Norris advises the use of a medicine dropper with a soft rubber nozzle introduced into the vagina, especially in children. If the secretion is intended for microscopic examination only and not for culture, the dropper may be partially filled with bichlorid of mercury solution 1 : 5000. This is introduced into the vagina and by expanding and compressing the bulb a few times a sort of emulsion of the vaginal exudate is formed. The bichlorid fixes the cellular elements and when dried on the slide they are of perfect form.

Data to Be Obtained from Pelvic Examination.—Inspection of the external genitalia under a strong light will disclose the presence of condylomata and whether they are of the flat form (condylomata lata) or slender and erect (condylomata acuminata). Areas of redness on the labia or shallow ulcerations are noted. The amount and character of discharge, and whether or not there is a dermatitis about the pudenda the result of soiling with an excoriating discharge, is observed.

The condition of the hymen is of importance, since its destruction is usually significant of sexual congress, although its presence by no means denies this act.

Bartholin's glands are located on the lower aspect of the labia majoris, just external to the fourchet and being set deep in the tissues are not palpable when in a healthy state. The palpation of a hard, pea-sized nodule, or the presence of a fluctuating swelling 1 or 2 centimeters in

diameter, is conclusive evidence of a bartholinitis, especially if there be some redness of the orifice of the gland on the internal surface of the vulva. If a mucopurulent discharge can be expressed from the orifice on milking the duct, the information is complete as to inflammation of these glands, which is generally of gonorrheal origin.

The vagina rarely yields any evidence of chronic gonorrhea, although in the occasional instances of vaginitis there may be marked congestion together with the presence of shallow ulcers usually on the rectovaginal septum; at times they also may be found on the lateral orifice of the vagina.

The urethra may show some redness and swelling of the mucosa about the meatus and in acute cases the swelling and edema may be so great as to produce a deep red eversion or pouting of the mucosa which extends beyond the meatus. By gentle milking of the urethra a discharge of whitish or yellow mucopus may be produced, especially in the more acute cases.

Skene's glands may be inspected by the use of Hunner's hairpin retractors, which are made by bending the closed ends of small hairpins at an obtuse angle and fixing them in hemostats. By the use of these little retractors the orifice of Skene's glands lying on the posterior surface of the urethra, just internal to the sphincter, are exposed and their condition noted. In gonorrhea these ducts are reddened and exude a mucopurulent secretion. Should the patient be extremely sensitive, a 4 per cent cocain solution brought into contact with the outer end of the urethra for one minute by means of a cotton applicator, will insure abundant anesthesia.

The cervix is next to be examined. A bivalve speculum of the Graves' type offers excellent exposure and under a strong light the cervix may be inspected in detail. In some very chronic cases there will be no visible pathology of this organ, save possibly a glairy clear mucus issuing from the os.

In most instances, however, the discharge is thick, yellow or greenish and when wiped away from the vaginal portion of the cervix is seen to be of a bright red color, with possibly a few yellow, pinhead-sized macules arranged in a circular fashion around the os. These *maculæ gonorrhoicæ* of Sänger are very characteristic of the disease when present. There may be some erosion of the cervical mucosa but ulceration is rare.

The entire cervix may be large and dense or may have undergone no change whatever in this respect.

The genitalia having been inspected, smears must be carefully made from all the structures possibly involved.

Cotton applicators are generally utilized for making smears, but since shreds of cotton often soil the field and the cells containing gonococci frequently become enmeshed in the cotton and are not deposited on the slide, the writer much prefers the ordinary platinum loop mounted on a glass rod which is used by bacteriologists.

With this instrument discharge is collected from the cervix, the urethra, and the vulva around the orifice of Bartholin's glands, the loop being flame sterilized between each application. For purposes of identification it is well to spread the material obtained on slides in the form of first letters of the organ from which the smear was taken; thus, *C, U* or *B* on a slide which will stand out clearly after staining, will serve to determine the origin of the exudate to be examined, without further labeling. Culture tubes may also be inoculated at this time.

The urethral and vulvar smears should be taken before the insertion of the speculum, since if this is done afterwards the areas in question may be contaminated by the withdrawal of the instrument which has been in contact with an infected cervix.

The smears having been completed, the speculum is removed and a careful bimanual examination is made with the gloved hand, to determine the presence or absence of salpingitis, which is manifested by the existence of more or less dense, irregular masses in one or other of the vaginal fornices, together usually with some fixation of the uterus. The tubal masses are sensitive to pressure on deep palpation.

A heavy, boggy, somewhat tender and usually retroverted uterus is strongly suggestive of chronic metritis, which diagnosis is rendered more probable by the finding of gonococci in the secretion.

Inguinal adenitis is sought for by gently passing the fingers along the upper border of Poupart's ligament.

Complement Fixation Test.—See page 19.

DIAGNOSIS BY VACCINATION

The work of Irwin, in 1908, showed that the subcutaneous injection of dead gonococci in persons suffering from gonorrhea resulted in a local and general reaction within twelve to twenty-four hours. Pain, redness and swelling at the point of injection, with malaise, leukocytosis and sometimes fever, were the essentials of the reaction.

In normal persons used as controls, little or no reaction developed, which seemed to substantiate the claim that this is a special procedure.

The method is of unquestionable value, but is not commonly employed, it having been more or less superseded by the complement fixation test (see page 19).

CHAPTER XII

ACUTE GONORRHEAL INFECTIONS

ACUTE URETHRITIS

It has previously been shown that the urethra is the organ most usually the seat of a primary infection, an average of the various published statistics placing the proportion as about 80 per cent of all cases. If not the primary focus, the urethra is sooner or later affected in the great majority of cases. The canal being only 3 to 4 centimeters in length in women, inflammation in it is much less severe than in the male. Anatomically, the urethra contains a number of small glands lying between the longitudinal folds of the mucosa. On its floor, just inside the urinary meatus, lie the two Skene's glands, fairly large structures which run from 10 to 20 centimeters along the floor of the urethra.

Gonorrheal infection usually first produces its reaction just within the urinary meatus and symptoms as a rule appear before three days after inoculation.

The mucosa at the meatus becomes reddened, swollen and everted, and sometimes it is even protruding from the meatus. In less severe cases, the entire meatus is intensely red and edematous. On eversion of the meatal lips the two orifices of Skene's gland are seen as little yellowish spots, one on either lateral aspect of the floor of the urethra and surrounded by inflamed and congested mucosa. There is a thin watery discharge which later becomes thick, white or yellowish and occasionally blood streaked.

Abscesses may develop in Skene's glands or about the urethral tube. On vaginal examination, the urethra may be felt as a somewhat tense cord, pressure upon which elicits considerable pain.

There is usually more or less pain and burning on urination and some bladder tenesmus, although the subjective symptoms of even a severe urethritis may be very slight. The discharge, which contains large numbers of gonococci, may be irritating to the mucous membrane of the vulva and set up a dermatitis there. Within a few weeks or even less, the

acute signs disappear, the congestion fades and the condition rapidly becomes chronic.

The diagnosis of urethritis *per se* is unmistakable, and the demonstration of gonococci in the discharge or in smears made from the exudate from Skene's glands will determine the nature of the infection.

Treatment here is based, first, upon preventing the ascent of the infection from the lower to the upper genital tract, and secondly, on the destruction of the organisms themselves.

The keynotes of success are gentleness of manipulation with a reduction of traumatism to a minimum and avoidance of irritating antiseptics or gonococcicides.

If the organisms are demonstrable in the urethra, the outer portion of the canal should be gently swabbed with a 2 per cent solution of silver nitrate, daily, immediately after urination. No douche is to be used nor should a speculum be introduced during this stage.

The patient is placed upon a low protein diet with the avoidance of highly seasoned foods. Coffee and alcohol are prohibited. Skimmed milk is an important article of diet. A urinary antiseptic, as for example, hexamethylenamin in 5 grain doses four or five times daily, is exhibited. Should the silver nitrate solution prove irritating and painful, argyrol or other bland silver salt should be substituted. Under no circumstances may syringes be used to instill germicidal solutions into the urethra, since by this means the bacteria may be carried back along the urethral mucosa until the bladder is reached. The swabbing is to be performed with small, tightly wrapped cotton applicators or better still with a sterile medicine dropper from which the silver nitrate may be gently applied to the outer portion of the urethra.

In women, urethritis is usually confined to the area just behind the meatus, the bacteria lodging in Skene's glands. Only rarely is there a generalized urethritis.

Later, if there be a persistent purulent discharge when the urethritis is milder, and if, upon distending the meatus with two hairpin specula, (see page 139) there are seen two small red macules one on either side of the midline and just behind the external urinary sphincter, abscess of Skene's gland is commonly present. The glands may either be freely opened for drainage or they may be cauterized.

In either case, local anesthesia should be induced by painting the urethra with 2 per cent novocain or procain. After a few moments interval a hairpin speculum is placed over one of the swollen gland orifices,

a slender bistoury inserted into the orifice and the gland slit up. The glands usually lie about one-eighth inch below the surface mucosa and are about one-quarter inch in diameter. The same procedure is now carried out on the opposite side, and the urethra flushed with argyrol.

So many offices are now equipped with electrically operated cautery instruments that this plan of treatment is generally applicable. Anesthesia is induced as before, the gland exposed and one of the delicate cautery points, now universally obtainable, is then heated to a bright cherry red, thrust into the gland orifice and held for a few seconds until the gland tissue is destroyed.

This process is more painful than incision and may require the submucous injection of a few drops of novocain solution to obtain the required anesthesia.

One such cauterization or incision with instillation should suffice to destroy the organisms in Skene's glands, although in certain obstinate cases it becomes necessary to repeat the process one or even several times.

ACUTE VULVITIS

Neisserian infection of the vulva comprises about three-fourths of all the instances of this lesion. It presents itself as a more or less violent inflammation, with reddening and thickening of the tissues, edema of the labia and vestibular folds, and invariable infection of Bartholin's glands and the tubules of Skene in the urethra. Indeed, the evidence of inflammation in these structures almost establishes the diagnosis of gonorrheal vulvitis. There is a discharge, at first thin and scant, then rapidly becoming thick and purulent and laden with gonococci. There may be pseudodiphtheric membrane with a raw or ulcerated surface beneath it. Secondary dermatitis causes areas of small pustules to surround the vulva. The inguinal glands rapidly enlarge and bubo may form.

Diagnosis.—Vulvitis in adults is not a common condition, the vulvar tissues offering excellent resistance to infection. As a result of trauma, however, the resistance may be lessened and vulvitis results.

The diagnosis of the gonorrheal nature of this condition is based upon the demonstration of the organisms in the discharge, upon the fact that Bartholin's and Skene's glands are involved and upon the resistance to treatment of this variety of vulvitis.

The symptomatology is what one might expect: Pain, made worse by the friction of walking, burning on urination, the discomfort of the

Fig. 40.—Acute Vulvitis with Condylomata about Anus and on Perineum.
(Author's case, Philadelphia General Hospital.)

Fig. 41.—Bilateral Inguinal Bubo with Acute Vulvitis.
(Author's case, Philadelphia General Hospital.)

swollen and edematous labia, and occasionally mild constitutional disturbances.

Treatment.—This consists, first, in preserving cleanliness by shaving the pubic hair, after which the bland silver salts, as argyrol in 25 per cent solution or protargol in 10 per cent solution, are to be freely applied to the irritated surfaces, the parts being constantly kept moist with one of these solutions. Occasionally the old *lotio nigra* or black wash (calomel grains 60; lime water 1 pint) is a soothing and antiseptic agent highly acceptable to the patient. A small strip of cotton saturated with the solution employed is placed between the labia to keep the inflamed surfaces apart.

Douching is forbidden, because of the danger of contaminating the upper genital passages, and the patient is given especial instruction as to the danger of infecting the conjunctiva with the vaginal discharge.

When the attack is unusually severe, hot lead water and laudanum may offer great relief, if applied upon a cotton pad, saturated with the solution, and, in such cases, the patient should remain in bed until the congestion and edema have to some extent subsided. Should little ulcers appear upon the labia they may be touched with a stick of silver nitrate to hasten granulation.

Hot sitz-baths, using a solution of sodium bicarbonate, are highly beneficial and aid materially in the difficult task of keeping the parts clean. Overtreatment must be avoided in the acute stages of the disease and the application of corrosive or irritating germicides spells disaster.

ACUTE BARTHOLINITIS

Bartholin's or the vulvovaginal glands are paired mucous glands, situated on either side of the posterior portion of the labia majora, sometimes completely and sometimes partially under the bulbocavernosus muscle, and extending backward to the posterior layer of the triangular ligament. In health, these glands are about 1 centimeter in diameter and have ducts which empty on the floor of the vestibule just inside the labia minora. Their function is to lubricate the introitus. Owing to the position of the orifice of Bartholin's glands, and the congestion excited by coitus, infection of these structures is extremely common, about one-half of all cases developing either unilateral or bilateral bartholinitis. For the same reasons, infectivity may persist for a long time in these gland tissues. They share with the cervix the onus of being lurking places for dormant gono-

cocci for months and even years. To such an extent is this true that it is usually impossible to eradicate the organisms from these structures without complete removal of the glands.

Evidences of infection are found in the reddened orifices of the ducts and by the fact that abscesses in the glands themselves are very common.

Bartholinitis is almost certain to be present when gonorrheal vulvitis exists, although the latter may be, and generally is, absent in the presence of infection of these glands.

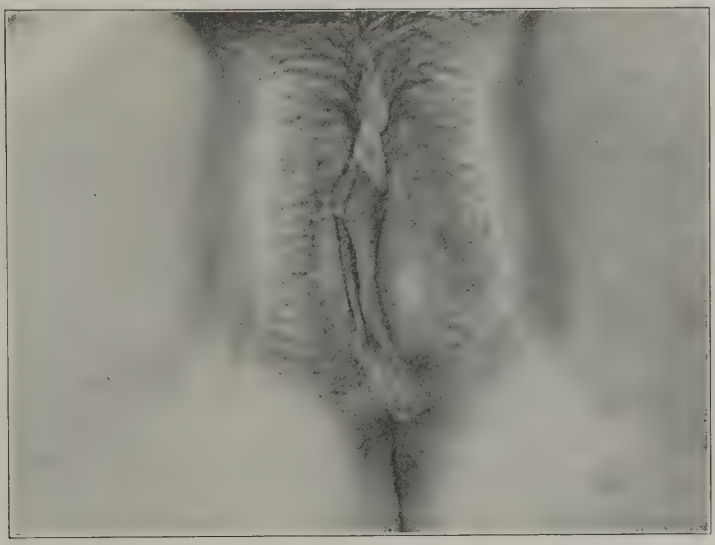

FIG. 42.—ABSCESS OF BARTHOLIN'S GLAND.
(Author's case, Philadelphia General Hospital.)

Abscess of Bartholin's glands is marked by a distinct marblelike enlargement of the organ, by very great pain, worse on sitting, exercise or defecation and by a mild constitutional reaction, moderate elevation of temperature, pulse rate, and leukocytosis. Occasionally the abscess may reach huge proportions, distorting the vulvar outlet and causing agonizing suffering. The abscess is rarely produced by the gonococcus alone, but is usually the result of a mixed infection, the staphylococcus, streptococcus or *B. coli communis,* aiding in the tissue destruction.

Diagnosis.—The diagnosis is usually simple, although the condition may be mistaken for a pudendal hernia or a vaginal cyst.

Hernia usually presents no inflammatory features, is not so sharply

circumscribed and is not associated with other evidences of gonorrhea. There is an impulse on coughing and resonance on percussion.

Vaginal cysts are rare, very seldom bilateral (as is often the case in bartholinitis), and are frequently quite large. The mucosa is freely movable over the cyst and rectal touch will usually clear up the matter of location.

Vulvar tumors are more dense, and present no evidence of inflammation.

Treatment.—Excision of the entire gland is the only advisable treatment. Simple incision and drainage or cauterization usually lead to recurrence of the abscess. Aspiration of the abscess cavity and its subsequent injection with pure carbolic acid, formalin, mercurochrome or other germicides has been practiced but without good results.

The removal of the infected gland is a procedure of some little magnitude, usually requiring a general anesthetic or thorough regional anesthesia with 0.5 per cent novocain solution.

After the proper preparation, an incision is made in the inner aspect of the labia majora over the swollen gland. The skin and mucosa are dissected back, care being required not to buttonhole the flap. By blunt dissection, the gland is thrust forward into the incision and then freed from the surrounding tissue by sharp dissection with scissors. It may be necessary to have an assistant insert a finger into the rectum and so push the gland outward and forward into the incision. Should the abscess rupture, it is well to pack the cavity with a narrow strip of gauze, in order to facilitate the removal of the gland as a whole. Sharp hemorrhage may occur, but is usually easily controlled by a few deep sutures bringing the fibers of the bulbocavernosus into apposition. The incision is then closed by a subcutaneous or interrupted suture, a little strip of rubber dam being allowed to protrude from the lower extremity for forty-eight hours.

Should the duct of the gland only be infected, it may be possible to sterilize it by the injection of 5 per cent solution of silver nitrate introduced with a syringe through a probe-pointed hypodermic needle which has carefully been inserted into the orifice of the duct. Two or three minims of the solution may be introduced into each duct.

CYSTS OF BARTHOLIN'S GLANDS

Occasionally, following gonorrheal infection of their ducts, these glands suffer retention cysts which sometimes reach a diameter of 5 or 6 centi-

meters. The cysts are usually painless but may give rise to pressure symptoms during coitus.

The symptoms are simply the presence of a painless, fluctuating tumor underlying the site of Bartholin's gland, usually distorting the vulvar orifice by displacing the overlying labium inwards.

The treatment is excision, as outlined in the management of abscess. Simple incision and drainage or aspiration are almost never efficacious.

CONDYLOMATA ACUMINATA

Venereal warts, or verruca acuminata, as condylomata are variously designated, are a common accompaniment of acute gonorrhea. They appear

FIG. 43.—CONDYLOMATA ACUMINATA.
(Author's case, Philadelphia General Hospital.)

upon the perivulval skin and area surrounding the anus as wartlike growths having various appearances and of variable size and extent.

The true etiological nature of these excrescences has not been determined but they are apparently of toxic origin with the irritating discharge with which the entire pudendal region is continuously bathed during an attack of gonorrhea, as a potent contributing factor.

Gonorrheal condylomata are usually papillary, having a more or less pointed tip, whence the term condylomata acuminata. They may be single, little frondlike masses scattered over the skin surface, arising from a slender base and averaging 3 or 4 millimeters in length, or they may be confluent, cauliflowerlike, masses surrounding the vestibule and the anus or covering the entire perineum. They are usually bathed in a thin, offensive and excoriating discharge and vary in color from a clear pink to a dirty necrotic gray.

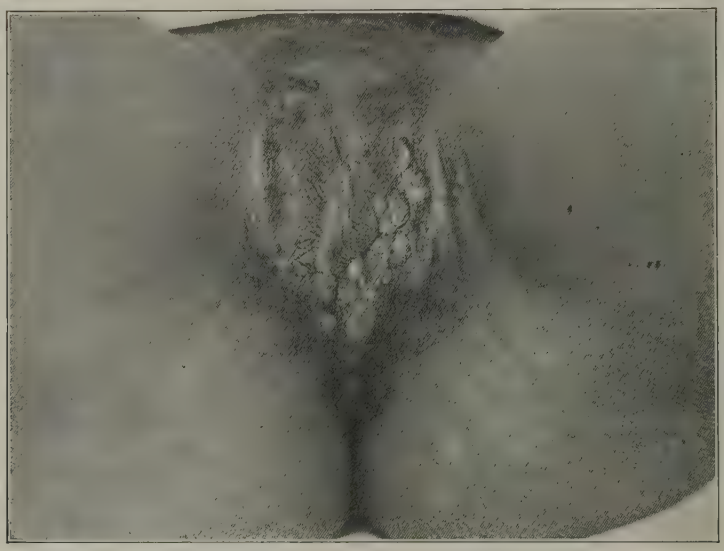

Fig. 44.—Condylomata Acuminata in More Acute Stage.
(Author's case, Philadelphia General Hospital.)

Histologically, these tissues are an inflammatory hypertrophy of the outer layers of the skin, the papillæ forming their chief constituents.

They have a rich blood supply and usually spring from skin or mucous membranes which is the seat of a chronic inflammation.

Their origin may be from a slender basal pedicle or they may be flat and sessile, although the former is the rule.

Diagnosis.—The diagnosis of condylomata offers no unusual difficulties, the only important differentiation being from the venereal warts caused by syphilis. The pointed tip, the tendency to spring from a distinct pedicle, the fact that ulceration is uncommon, will serve to identify

the gonorrheal form, while the demonstration of gonococci in the one case and the presence of a positive Wassermann reaction in the other will certify as to the nature of the lesion.

Obviously both diseases may exist simultaneously in which case the condylomata present may be due to either one or both and a differential diagnosis becomes impossible.

Small scattered condylomata are sometimes found in the absence of any evidence of venereal disease, being due in these somewhat isolated

FIG. 45.—AN UNUSUAL DISTRIBUTION OF CONDYLOMATA.

These growths are not common on the mons veneris. (Author's case, Philadelphia General Hospital.)

instances to personal uncleanliness, associated with an irritating leukorrhea resulting from an old endocervicitis. Condylomata are occasionally noted in infants and young children, and are much aggravated by pregnancy.

Symptoms.—As so commonly the case with lesions about the vulva, condylomata rarely give rise to symptoms except when they exist in massive proportions and cause some distress by their bulk and the chafing incident to walking. Pain is present only with ulceration, a fairly uncommon complication of these growths. The discharge is quite offensive and may set up an annoying dermatitis on the perineum as well as the inner surfaces of the thighs. Constitutional symptoms are rarely present.

Treatment.—The management of these growths depends upon keeping them dry and free from irritating discharge, and then to excise those which fail to atrophy and disappear.

Lotio nigra, freely applied on a cotton pad and held in place by a T-binder, gives excellent results but is not applicable to ambulatory patients. In such cases, painting the entire surface involved with 2 per cent solution of mercurochrome or 5 per cent tincture of iodin and then applying a drying powder, as aristol or zinc stearate, is sound treatment.

D. Watson (*Lancet,* 1912, 4:13, L. 990 quoted by Norris) reports excellent results from the use of lactic acid. Large masses are isolated and kept surrounded by strips of lint moistened with a 0.5 or 1 per cent solution lactic acid and the base of the tumors touched at intervals with the pure acid.

Small growths are painted with a strong solution or with the pure acid. When the field is large the minute vegetations are covered with a wet dressing. These dressings are frequently changed and after each change a sitz-bath is administered. Watson states that small masses drop off, that the growth of large vegetations is inhibited and that a cure results without leaving cicatrices and without accompanying pain. Occasionally, if the treatment is pushed too energetically, a mild erythema is produced and on this account, if large areas are involved, the healthy skin should be protected by vaselin.

Sometimes the warts may be frozen with a stream of ethyl chlorid directed against their bases for several minutes, with a resulting necrosis and atrophy, as advocated by Schein.

The writer believes that the quickest and safest plan of treatment is a complete excision of the growths at one sitting.

Anesthesia is necessary and if the condylomata are single, the base of each may be infiltrated with a 0.5 per cent novocain solution. Should the tumors be confluent and have sessile bases, caudal anesthesia is the method of choice, except in very neurotic women, when nitrous oxid may be utilized. The entire operative field is coated with a 2 per cent solution of mercurochrome preferably sprayed on with an atomizer, in order that the solution may get under the mushroomlike growths and thoroughly cover the skin surface.

The warts are then shaved off with a large, very thin scalpel, or better still a safety razor blade. The bleeding surfaces are again sprayed with mercurochrome, thoroughly dusted with aristol or some similar drying powder and pressure applied by means of a large gauze pad and a

tight T-binder. Ligation of vessels is rarely necessary but may be employed if the bleeding is persistent.

When the condylomata are very large, vascular and numerous, such excision is contra-indicated until the growths have undergone considerable atrophy as a result of the local treatment outlined above.

During pregnancy a wide excision may lead to abortion and the procedure is accordingly not advised under such conditions.

FIG. 46.—MARKED EDEMA OF LABIA AND TISSUES ABOUT CLITORIS IN A CASE OF VULVITIS COMPLICATED BY CHANCROID.

(Author's case, Philadelphia General Hospital.)

In general, however, excision shortens the duration of treatment, is definite and usually entirely satisfactory.

Vaginal Condylomata.—Occasionally one may meet with venereal warts in the vagina, the lower portion of the canal being most generally affected although the deeper areas may sometimes be the seat of these growths. Vaginal condylomata may spread from a vulvitis, may be primary in the vagina or may follow a gonorrheal cervicitis.

The *diagnosis* is usually not difficult, and is positive in the absence of clinical or serological findings indicating the presence of syphilis.

The *treatment* is to clean out the vaginal discharge as soon as possible, and for this purpose nothing is better than the mixture of equal parts of

fullers' earth and sodium bicarbonate. Several drams of the powder are introduced into the vagina, whose walls have previously been swabbed with a 20 per cent solution of silver nitrate, and held in place by means of a wool tampon. The treatment is repeated at twenty-four-hour intervals and the irritating vaginal discharge is frequently cleared up within a week.

FIG. 47.—CARCINOMA OF VULVA.

This case offered great difficulty in diagnosis as, owing to the hyperplasia of tissue, it simulated a venereal condition.

Any remaining condylomata should be excised, preferably under local anesthesia with novocain 0.5 per cent or by freezing with ethyl chlorid. The bases of the excised warts may be touched with pure carbolic acid or better by a small actual cautery heated to a dull red.

Care must be observed that the excision is not too wide, as the lumen of the vagina may be unduly narrowed by scar formation.

ACUTE VAGINITIS

This is an uncommon finding but when present is a lesion of considerable moment. The adult vaginal mucosa is extremely resistant to infec-

tion, whereas in childhood, when the outer layer of stratified squamous epithelium is poorly developed, and in old age when this layer has undergone atrophic change, acute inflammation is fairly common.

The entire vaginal mucosa becomes hot, dry and edematous, the edema being followed by more or less exfoliation of the cells. Elevation of temperature, malaise and the other constitutional manifestations of acute infections are usually present. There may be a severe ulceration of the vagina, the ulcers being especially prominent almost to the inner edge

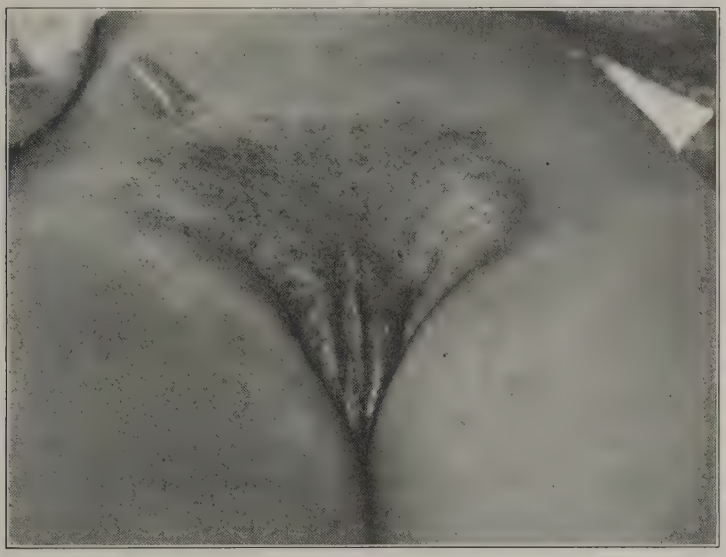

FIG. 48.—INGUINAL BUBO WITH SUPPURATION.
(Author's case, Philadelphia General Hospital.)

of the hymen or its remains. The ulcers are shallow, their floors covered with a grayish membrane and they bleed easily upon touch.

Vaginal examination is usually difficult in these cases because of the severe pain elicited, and proper exposure with the speculum is almost impossible.

The onset of acute vaginitis is characterized by severe burning and pain in the entire pudendal region. Urination and defecation increase the pain. The discharge is at first scant, thin and acrid but in a few days becomes copious, yellowish or greenish and frequently possesses a foul and disagreeable odor.

Inguinal adenitis usually follows acute gonorrheal vaginitis within a few days, and there may be abscess formation in the inguinal gland, the so-called bubo inguinalis.

During the acute stage gonococci are present in large numbers and may easily be recovered from the discharge, but as the condition becomes subacute, the organisms diminish in number and frequently offer great difficulties in determination.

Acute vaginitis developing during pregnancy is a most serious condition and in one case seen by the writer, the vagina was gravely damaged by ulceration and cicatrization of its walls, the labor terminated in a difficult forceps operation with deep laceration of the cicatrized and contracted vaginal canal.

Secondary Vaginitis.—An acute inflammation of the vagina may develop at any time during the course of an attack of gonorrhea as a result of continued irritation of the vaginal mucosa by the acrid cervical discharge. This type of infection is not directly due to the gonococcus but is purely a reaction to irritation, and as a result the organisms are sometimes difficult to discover in the vaginal secretions and, indeed, are frequently entirely absent. Norris advocates Schultze's plan of locating the point of origin of the specific organisms in such instances. This consists in thoroughly cleansing the vagina and external genitalia by means of irrigation and swabbing, and then inserting a tightly fitting tampon of sterile absorbent cotton against the cervix. If the secretions that collect in the vagina below the tampon contain gonococci, this is evidence that a specific vaginitis is present, whereas if the upper surface of the tampon is contaminated and the vaginal secretion is found to be negative, the infection is obviously confined to the uterus or appendages.

Diagnosis.—Gonorrheal vaginitis must be distinguished from diphtheric vaginitis, and from those infections due to more specific pyogenic bacteria and to the irritating discharge from carcinoma of the uterus and to simple uncleanliness. The differentiation from diphtheria is not difficult since the latter rare condition is associated usually with severe constitutional manifestations, and on inspection the vagina is seen to be covered by a minute, grayish membrane which bleeds easily and leaves a characteristic raw surface upon being removed. The inflammation due to non-specific pyogenic bacteria and to uncleanliness is sometimes impossible of differentiation from the gonococcal variety of vaginitis except by the demonstration of the gonococcus in smears made from the discharge.

Treatment.—Acute gonorrheal vaginitis is a disease of considerable moment, as has been stated, and must be regarded as a rather serious illness. Rest in bed for several days or sometimes weeks is an absolute necessity. The diet should be light, free from sharp acids or spiced foods and low in protein, and fluids should be vigorously pushed since there is so generally present an associated urethritis. The bowels should be regularly moved, with mild cathartics, enemata or douches being contraindicated by reason of the danger of infecting the rectum.

Bromids and sometimes a mild opiate as codein sulphate in 0.25 grain doses, may be required to allay the pain and irritation.

Locally, it is a good plan to fill the vagina with a 20 per cent solution of argyrol or other bland silver salt, with the patient in the knee-chest position while the installation is being made, a glass or rubber bulb syringe being used for the injection. The entire vulvar region is then covered by a large gauze-covered cotton pad which is saturated with a 50 per cent solution of hot magnesium sulphate. The pad is held in position by a T-binder and the patient permitted to abandon the knee-chest position and lie down.

The large pad serves to absorb such argyrol solution as escapes from the vagina, and the magnesium sulphate is a sedative to the inflamed vulvar skin and mucosa as well as a valuable germicide. Local heat may be maintained by the use of a hot-water bag.

After a few days of this treatment, the acute inflammation usually subsides, and more vigorous gonococcicidal measures may be employed. Swabbing the vagina with a 5 per cent solution of silver nitrate, cauterizing the shallow ulcers which sometimes appear with lunar caustic stick, and the instillation into the vagina of a dram or two of equal parts fullers' earth and sodium bicarbonate, the powder being retained by means of a lambs' wool tampon, all tend to terminate the inflammation and to restore the exfoliated mucous membrane.

After the acute stage has completely passed, the vaginal mucosa becomes thickened and hypertrophied, discharge persisting as a thick, tenacious, yellowish-white leukorrhea. At this time a strong solution of silver nitrate (6 to 10 per cent) thoroughly swabbed over the entire vagina, aids both to destroy the gonococci and to prevent their growth.

ACUTE CERVICITIS

The cervix is probably the most common site of primary infection by the gonococcus, in parous women, in contradistinction to the non-parous

patient in whom the urethra is the organ usually first affected. Since gonorrhea is most generally transmitted by coitus, it is apparent that the relaxed introitus and wide vagina of the parous women permit the penial orifice to come into immediate contact with the cervix and cause its direct inoculation.

In non-parous and unmarried women, the introitus is small, entrance slow and difficult and the bacteria are commonly applied to the anterior vaginal wall and the urethra, the cervix possibly being not touched at all during the act.

Because the gonococcus infects mucous membranes as a general rule, and only rarely dwells in serous tissues, true cervicitis is uncommon, the bulk of the cases being those of endocervicitis.

Just as it is the most frequent primary manifestation of gonorrhea in women, so is endocervicitis the least productive of symptoms of any variety of the disease. Profuse leukorrhea, of a mild purulent character, and possibly a sense of weight in the lumbar region, are usually the only subjective evidences of such infection. Brettauer (*Am. J. Obst.,* Sept. 1911, p. 457) calls attention to pains along the line of the inguinal glands and in the lumbar region at the menstrual period, as significant of acute gonorrheal endocervicitis.

The menstrual cycle may be variously altered, the flow being more profuse, less profuse, and moderately irregular in some cases.

Leukorrhea is usually profuse, thick, yellowish-white and sometimes may be blood-stained. In the acute stages this discharge is not specially irritating to the surrounding skin, but as the disease becomes chronic, the material becomes decidedly excoriating, giving rise to most annoying dermatitis in some patients. The discharge is composed of mucus, pus cells, débris, cervical and vaginal epithelia and gonococci usually in large numbers.

On examination the cervix is found to be hypertrophied, and soft. The mucosa about the external os is very bright red and by reason of its swelling and edema it may protrude beyond the line of the os, causing an eversion or ectropion which may bleed a little upon touch. Little punctate areas of deeper red may surround the os from which there exudes the yellowish, mucopurulent discharge so characteristic of the disease. On pressure, the cervix and whole lower uterine segment is apt to disclose tenderness, although there is rarely pain without manipulation.

Diagnosis.—The diagnosis of acute gonorrheal cervicitis or endocervicitis presents no especial difficulties, since gonococci are generally de-

monstrable in the discharge in large numbers. When the organisms are not found after repeated and painstaking examination, one is never justified in making a positive diagnosis of venereal infection, since the opinion cannot be supported by facts nor sustained in court, should a medico-legal question arise. If the gonococcus is the causative organism, they will surely be found in the exudate at some time, if enough and careful examinations are made. Then and then only may the diagnosis be announced.

Treatment.—In the acute stage, endocervicitis should be treated with a view to securing a minimum of trauma and a maximum of germicidal action. For this purpose, filling the vagina with one of the bland silver solutions, as 25 per cent argyrol, and holding it in place with a well-vaselined tampon, often is of the greatest value. If this be impracticable, the cervix may be painted or sprayed with a 6 to 8 per cent solution of silver nitrate and a dram of the fullers' earth and sodium bicarbonate powder, introduced into the vagina. Following this initial treatment, the vagina is to be gently irrigated, twice daily with bland silver solution or very weak tincture of iodin (2 to 3 per cent) until the redness and congestion disappear and the leukorrhea has discontinued.

Acute endocervicitis almost invariably becomes chronic and develops an enormous resistance to any medical agents whatever, as will be shown later.

ACUTE ENDOMETRITIS

The gonococcus is the only bacterium which successfully passes the barrier of the internal os to set up a true corporeal endometritis. The work of Curtis showed conclusively that pathogenic bacteria other than the gonococcus are practically never found inhabiting the endometrium even though an endocervicitis of long standing be present.

In gonorrhea, however, ascending infection is relatively common, probably 50 per cent or more of cervical infection, eventually extending above the internal os, when the process involves the endometrium, the uterine musculature and in many cases the tubes and ovaries.

It is usually essential that the endometrium should have either suffered from trauma or be at a low stage of resistance if acute gonorrheal endometritis is to develop, and hence the condition is almost invariably preceded by parturition, an abortion or even a menstrual period. In certain instances, intra-uterine instrumentation during the course of treatment of a cervicitis may cause an extension of the disease upward.

Endometritis in general is an uncommon disease, Norris stating that of 995 endometria examined by him for various reasons, only 208 showed any evidence of endometritis, and that of these 208, about 60 per cent, were presumably gonorrheal in origin as determined by a scrutiny of the history and clinical course.

Curtis has demonstrated that the endometrium is seldom a habitat of bacteria, and that when these organisms are introduced into the uterine cavity, their virulence is rapidly lost. Brenner maintains that gonococci lie dormant in the utricular gland for long periods and that they become active upon traumatization of the uterine mucosa.

Pathologically, in acute gonorrheal endometritis, the entire musculature is slightly hypertrophied, is soft, puffy and succulent from congestion and serous exudate, while the mucosa may be soft and spongy or granular in appearance.

On microscopic examination the most marked changes are found in the superficial portions of the endometrium, where the mucosa is swollen, edematous and hypertrophic.

Symptomatology.—Acute gonorrheal endometritis is marked from its onset by constitutional manifestations. Fever up to 100°F., a moderate elevation of the pulse, generalized pelvic pain, extending to the rectum and increased by defecation, are the usual symptoms but the pain is not as a rule unbearably severe. There may be rigidity, but not marked, of the lower portion of both recti muscles, and a moderate leukocytosis is commonly present. Nausea and vomiting sometimes are present. The vaginal discharge becomes increased in amount and thin in character, unless, as Norris points out, an old cervicitis becoming stimulated by the uterine infection pours out its thick and tenacious fluid which becomes mixed with the endometrial leukorrhea, obscuring the nature of the latter. The discharge may be blood-streaked, although this is an uncommon finding.

On bimanual examination, the cervix is found to be softened and the canal patulous, the uterus is boggy, slightly enlarged and tender. The most significant characteristic of the disease is that all its manifestations are of a *mezzo forte* nature—fever is not high, pain is present but not severe, tenderness is not exquisite, there may be peritoneal irritation but not peritonitis; such a clinical picture, following an abortion, labor or a menstrual period, renders the diagnosis extremely suggestive. Menstrual disturbances are not infrequent, menorrhagia being the most constant abnormality. Norris says that dysmenorrhea, occurring in women in

whom menstruation has previously been painless and in the absence of other gross lesions, especially if gonorrhea is known to be present, constitutes a most important diagnostic feature.

Differential Diagnosis.—Acute gonorrheal endometritis must be differentiated from septic endometritis and inflammatory reaction in submucous fibroid tumors. In the former instance the symptoms are always more severe, the fever high, rigors prominent, marked rigidity of the recti muscles, high leukocytosis and a tendency to spread to the parametrium with a resulting pelvic cellulitis, possibly terminating in pelvic abscess. Gonorrhea, on the other hand, tends to spread to the tubes and not to the parametrium.

Acute inflammation of a pelvic tumor is usually associated with very marked symptoms, high temperature, severe chills and the discovery of a tumor on bimanual examination usually confirm the diagnosis.

It has been said that gonorrheal endometritis usually follows some trauma of the mucosa and for this reason it is a common accompaniment of parturition and abortion. Many of the low-grade types of puerperal infections so often seen, where there has been no handling during delivery and where the morbidity is seemingly inexplicable, are due to the development of a gonorrheal endometritis. So too with the milder pelvic infections that go with abortion, where temperature and pain persist with evidence of septic infection.

The *diagnosis* is assured if gonococci are found in the uterine discharge, but even this evidence is not absolutely indisputable, since an acute septic endometritis may well be superimposed upon an old cervicitis which, responding to the general congestion and hyperemia of the tissue, exudes gonococci-laden mucopus which, in turn, mixing with the endometrial discharge, gives an entirely false impression.

Treatment.—The management of acute gonorrheal endometritis is mainly expectant. Rest in bed, ice-caps or preferably hot-water bags to the lower abdomen, enemata or very gentle purgatives, as milk of magnesia, etc., are recommended. The vulva should be protected by a sterile pad and the excess discharge removed by irrigation with mild antiseptics.

The soiled dressings should be burned.

No local treatment is advisable until the acute stage has passed, when active measures may be instituted as will be discussed later on. Pain and restlessness may be combated by the coal-tar analgesics reinforced by codein and even morphin if necessary. The diet should be light and fluid, intake should be abundant.

ACUTE METRITIS

Following acute endometritis, the uterine musculature may be invaded by gonococci, especially when the muscle is soft, congested and has been subject to trauma as after abortion or labor. The changes in the uterus vary, from congestion and an exudate of small round cells distending the intramuscular spaces, to definite mural abscesses. The uterus is always enlarged, boggy, soft and very tender. Unless tubal adhesions hold it fixed, the organ is prone to retroversion under these conditions.

Symptoms.—The clinical picture is that of an exaggerated acute endometritis. The fever is somewhat higher, the pulse more rapid, the pains more severe. Leukocytosis is fairly high and there may be some rigidity of the recti muscles. Nausea and vomiting are frequent.

On bimanual examination, the uterus is large and very tender. Gonorrheal metritis is probably the most common cause of mild puerperal sepsis, when streptococcus invasion is absent.

Treatment.—This condition is to be managed along the same quiet, non-interference plan as acute endometritis. Rest in bed, in the Fowler position should the uterus be large and heavy; heat to the abdomen, no drastic purgatives, vaginal irrigation with mild antiseptics, as lysol 1 per cent, and the avoidance of vaginal manipulation and procedures whereby traumatism might occur and extension to the fallopian tubes be favored.

Should the uterus be very large and boggy, ergot may be exhibited, and certain observers report excellent results from the use of atropin. Pain is to be relieved by the use of coal-tar analgesics or by opiates if absolutely necessary.

ACUTE SALPINGITIS

Inasmuch as gonorrhea is a disease which spreads by direct continuity along the mucosa, salpingitis must always follow endometritis or metritis. Theoretically, it may be possible for the bacteria to pass from the vagina through the uterine cavity without infecting its tissues and so reach the tubes, no intermediate infection having occurred at all. Practically, this never takes place, the endometrium, at least, being usually affected.

Gonorrheal salpingitis always begins as an endosalpingitis but the inflammation rapidly spreads to the muscular and serous structures and

sets up a local pelvic peritonitis. This is in contradistinction to salpingitis of streptococcic or staphylococcic origin, where the infection is blood or lymph borne and the muscular and serous coats of the tubes are first attacked.

Gonorrheal salpingitis is always bilateral yet the disease processes may vary widely in the two tubes. The one may be the seat of a large pyosalpinx while the other shows the end results of persistent inflammation, *i.e.*, fibrosis, many adhesions and the pressure of a series of small hard nodules lying along the course of the tube. Free pus rapidly forms and may leak out through the fimbriated extremities setting up a perisalpingitis and pelvic peritonitis.

Salpingitis may develop within two weeks after the onset of a urethral gonorrheal infection, but such rapidity of extension is rare, a much longer time usually elapsing before the tubes are affected, which process usually occurs after some traumatism has prepared the internal mucosa for easy invasion by the organism.

It is difficult to determine the frequency of salpingitis as an extension of cervical gonorrhea, but it may be said that when the endometrium of the cervix is involved, salpingitis is the rule, whereas if the gonococci have not passed the barrier of the internal os, salpingitis is the exception.

As to the relative frequency of tubal involvement in gonorrhea, many series of statistics have been constructed. A combination of a large group of European figures made by Menge showed that the tubes and ovaries were involved in 25 per cent of the acute and 50 per cent of the chronic cases.

Diagnosis.—Acute salpingitis of gonorrheal origin presents the same symptom-complex as does the same lesion when due to other organisms, except that pelvic cellulitis is uncommon in gonorrhea whereas it is a frequent concomitant of acute streptococcus or staphylococcus salpingitis. The symptoms are possibly not so severe in gonorrheal infections as in others and the disease has a far greater tendency to become chronic. The diagnosis is usually greatly aided by bacteriologic knowledge of the existence of gonorrhea in the lower genital tract, but this may be a point of doubtful value, since salpingitis due to various pyogenic bacteria may exist coincidentally with an old neisserian infection of the cervix or another.

Since the gonococcus is responsible for something like 50 per cent of all cases of salpingitis, the others being divided among the staphylococcus, streptococcus, tubercle bacillus and a few other factors, it is apparent that

the majority of all cases may be regarded as having their origin in this organism, Curtis finding 70 per cent in a careful study of removed tubes in three hundred cases.

The figures vary greatly and are in general inaccurate, since the organisms causing a pyosalpingitis cannot be demonstrated in the tissues after a few months as a rule. In isolated instances the germs may remain quiescent for a considerable time, but the careful studies of A. H. Curtis (*Tr. Am. Gynec. Soc.,* 1921, p. 242) show that it is almost never possible to obtain gonococci in cultures from thoroughly ground fallopian tubes removed from patients who have been free from fever and leukocytosis for a period of more than ten days or two weeks. The fallopian tubes appear, therefore, not to be a focus for chronic gonorrheal infection. Persistently active gonorrhea of the tubes is evidently ascribable either to recurrence of infection from without or repeated invasion of bacteria from the chronically infected lower genital tract.

Symptoms.—Acute gonorrheal salpingitis usually begins with a chilly sensation, malaise, severe backache and localized pain and tenderness in one iliac fossa, rapidly extending to the opposite side.

The history will usually disclose some evidences of a preëxisting endometritis or metritis, and an abortion, labor, menstrual period, or sexual excess will usually be found to have immediately preceded the onset of symptoms.

The pelvic pain spreads rapidly over the entire lower abdomen, as the pus drips from the fimbriated extremity of the tube and infects the culdesac of Douglas. Abdominal rigidity, below the level of the umbilicus, is well marked. Fever is present to 102° to 103° F., rarely higher, the pulse is elevated, nausea and vomiting are present and the patient is manifestly seriously ill. Rectal tenesmus is a common complaint as is severe pain upon defecation, being due to the infection in the culdesac. On bimanual examination the uterus is found to be somewhat large and boggy, and on manipulation of the cervix severe pain is elicited. Both tubes are enlarged and very tender to pressure, and there is usually some induration in both fornices. These symptoms persist for several weeks, tympanites sometimes being troublesome and a mild degree of ileus sometimes being present. In due course the temperature falls, the pain becomes dull and aching or disappears altogether and the disease becomes chronic. Menstrual disturbances are frequent, menorrhagia, irregularity or sudden suppression being noted in almost equal ratio.

The virulence of the infection and the amount of pus escaping into

the peritoneal cavity are reflected by the degree of the general peritoneal reaction. The greater the tympanites, vomiting and intestinal paresis and the higher the temperature and pulse rate, the more virulent its infection.

Treatment.—The management of acute gonorrheal salpingitis is that of most acute intraperitoneal pelvic infections. Absolute rest, avoidance of all manipulation and examination, liquid nourishment by enemata, proctoclysis with 5 per cent glucose in tap water if vomiting is severe, soda bicarbonate to combat acidosis, cold or hot (preferably the latter) to the abdomen and opiates to relieve pain are the procedures of choice. Operative interference is absolutely contra-indicated, so long as there is any evidence that the organisms are still virulent as determined by fever and leukocytes.

As the acute symptoms subside, heat may be applied by means of long, copious vaginal douches at 110°F. if this temperature is well borne, or by an electric light heating apparatus which may be applied over the pelvic viscera and the degree and duration of the application gradually increased as the patient becomes more and more inured to its effect.

The keynote of treatment in acute salpingitis is avoidance of all manipulation, keeping the patient absolutely at rest, and stimulating the resistive forces by an abundance of sunlight and fresh air.

DIFFUSE PERITONITIS

Rarely there may occur an acute general peritonitis, the result of gonorrheal infection but without evidence of salpingitis or even endometritis. Goodman collected seventy-five such cases in 1907, the first one having been reported by Sänger in 1886. The diagnosis is only made definite by the isolation of the gonococci from the peritoneal fluid, and should never be made unless accurate bacteriological studies demonstrate these organisms in pure culture.

The symptoms are those of a mild general peritonitis and the mortality is about 15 per cent in adults and 20 per cent in children.

The disease may occur in children and young girls as a result of a preëxisting vulvovaginitis.

Treatment is that of diffuse peritonitis in general. Non-interference is the rule, supportive measures, opiates for pain and a maintenance of the fluid balance by proctoclysis, hypodermoclysis, etc., being indicated.

CHAPTER XIII

CHRONIC GONORRHEAL INFECTIONS

GENERAL CONSIDERATIONS

The great bulk of neisserian infections in women which come under the observation of a physician have passed their acute and entered upon their chronic stage.

Repeated abscess formation in Bartholin's glands, the result of reinfection, chronic cervicitis with its profuse and intractable leukorrhea, chronic salpingitis with its dragging backache and attendant sterility; such are the aspects of the insidious destroyer that causes its victims to seek medical aid.

Too much emphasis cannot be laid upon the fact that chronic gonorrhea in women is a mild disease, causing comparatively little discomfort and very few symptoms.

Leukorrhea and sterility are the two conditions complained of in most instances and it is remarkable how few patients, generally speaking, have any idea that they are victims of venereal disease and fewer still, when so informed, can throw any light upon the time or manner in which the disease was contracted.

The pathology of chronic gonorrhea differs from that of the acute stages, just as inflammations of other origin behave differently in the two phases.

There is no marked hyperemia, a little passive congestion only remaining. As has been stated, the infection almost invariably begins as a surface inflammation and the symptoms of the acute attack are based upon surface pathology.

As time goes on the gonococci burrow more and more deeply into the tissue, the surface epithelium of the attacked mucous membranes being severely damaged, the cells swollen, desquamated and indeed disappearing over large areas, to be replaced by a greatly modified squamous or low and irregular columnar epithelium, or by scar tissue.

Fully developed squamous epithelium, such as the lining of the vagina, successfully resists the gonococcus, the inflammation in such tissues being

usually the result of long-continued exposure to acrid and irritating discharges from above; although occasionally an exceptionally virulent strain of organism will set up a primary inflammation in such localities. Columnar epithelium is the natural habitat of the gonococcus and it is in these tissues that its greatest destruction occurs.

After causing desquamation and areas of complete destruction of the surface epithelium, the gonococci reach the underlying glands, attack their epithelial linings and later penetrate to the connective tissue of the gland wall, which undergoes a low-grade round-cell infiltration with much thickening and hyperplasia of the gland walls and the periglandular tissues. If the condition be severe, true abscess with complete destruction of the gland and its surrounding structure may result, or the orifice of the gland may become blocked and retention cysts result. As time goes on the gonococci lose their virulence and lie dormant in the tissues, only to be awakened into renewed activity when any congestion stimulates them, after which they cause repeated reinfection in tissues which have hardly recovered from a previous inoculation.

Scar tissue is common and may give rise to distressing complications. The organisms may be transported to distant viscera and tissues and remote foci of disease may be set up, as witness the frequent arthritides and the happily more uncommon endocarditis of gonorrheal origin. The disease in both sexes, but more notably women, is exceedingly chronic, the inflammatory change being generally of low-grade type, and extraordinarily resistant to curative treatment. Many gynecologists of ample experience and understanding maintain, indeed, that gonorrhea in women is an absolutely incurable disease and that no series of negative bacteriological findings is sufficient to warrant the belief that the infection has been completely eradicated. This view is somewhat extreme, but experience leads one to believe that it is not far from the truth.

Gonococci are difficult to demonstrate in smears and in the tissues themselves at this time. The most intractable endocervicitis may be persistently negative as to the presence of gonococci in the discharge, even after the most meticulous examination, and, indeed, sections of excised cervical tissue containing dilated cystic glands often fail to disclose the presence of the pathogenic bacteria.

The same findings are noted in the tubes, the seat of an old purulent, gonorrheal salpingitis and even in the abscessess of Bartholin's glands, although here the bacteria are more persistent and more frequently demonstrable than in other portions of the genital tract.

In spite of the difficulty in obtaining the organisms, however, female gonorrhea is persistently contagious, and the congestion and hyperemia of frequent intercourse commonly excites the dormant gonococci into activity, thus setting up a recrudescence of the original inflammatory reaction.

Diagnosis.—The diagnosis of chronic gonorrhea in the absence of demonstrable organisms must be based upon the history of the infection, the duration of the symptoms and the occurrence, at any time during the period of infection, of phenomena which are characteristic of gonorrhea alone. Bartholinitis, for example, rarely exists except in its gonorrheal form and when a history of such lesion is obtained, together with some evidence that urethral irritation preceded or shortly followed the vulvar adenitis, it is almost a certainty that the gonococcus is the offending organism.

Again, a persistent and rebellious cervicitis in a woman who gives no history of parturition or abortion and in whom no other tangible pelvic lesions exist, is usually of gonococcic origin, despite the absence of the confirmatory bacteriologic findings.

In this connection, it must again be remembered that a diagnosis made in the absence of gonococci in smears or tissues, is liable to severe medico-legal attack and a patient should never be informed that she is surely suffering from this disease unless the physician is prepared to defend his statement in a court of law. Without the evidence of positive bacteriological findings, this diagnosis usually falls before severe cross-examination and the testimony of opposing experts that organisms have not been discovered.

The patient may properly be told that clinically she is a sufferer from gonorrhea, but that until bacteriological studies confirm the diagnosis, no absolute statement can be made.

Bacteriological diagnosis is positive only when the slides have been examined by one familiar with the morphology and staining peculiarities of the gonococcus, and when these organisms are demonstrated in more than one smear. Too hasty conclusion and the too definite statement to the suspicious patient that she is infected with a venereal disease often lead to serious if not tragic consequences as is well illustrated by the following case, now under the care of the writer.

A young lady of excellent antecedents and education, spent some time with friends in a neighboring city and, while there, became infatuated with a young man and several times had sexual relations with him. Upon

her return home the girl became overwhelmed with remorse and fear and a conviction grew in her mind that she had contracted venereal disease. She went to several general physicians and gynecologists, none of whom could define any pelvic lesions, and had a number of smears examined, all of which were negative, until, one day, a pathologist reported "a few gonococci present." The patient was informed of the finding and straightway her conviction became a certainty and she developed a long train of false symptoms of neurotic origin. Within one year of the positive bacteriological report, the young woman in question has become addicted to intemperance, is a haunter of specialists' offices, insisting upon ablation of diseased tissues. She is a mental wreck, although never but once has a smear been returned positive, among the hundreds that have been examined, and at no time has there been the slightest clinical evidence suggestive of gonorrhea. The young man involved readily consented to examination and was found not to be infected.

This, of course, represents an extreme example of a psychosis, developing upon a mistaken diagnosis, but it might easily be multiplied many fold, and countless instances adduced of less marked disturbances to the family as well as to the individual from such hasty conclusions on the part of the medical attendant.

The importance of bacteriologic and serological measures as essentials in diagnosis cannot be overestimated and the attention of the reader is recalled to the chapter on bacteriology where the details of the procedure necessary are fully set out.

CHRONIC VULVITIS

If the acute stages of this lesion be neglected, it tends to become chronic, and it is characterized by a thin, milky discharge, often acrid and excoriating; by a thickening of all the tissues of the vulva, the labia often become swollen and leathery in texture. Indolent ulcers may appear which are auto-inoculable, a rosette of such ulcers sometimes encircling the fourchet and even extending over the perineum. Condylomata are commonly present, either discrete on the perineum or confluent and massed in this region and often about the rectum. The disease in this form is not common, since in general women will not permit it to proceed to such an extent. The *diagnosis* is based upon the clinical factors, the intractability of the condition and, of course, the demonstration of gonococci in the smears.

Symptoms.—The symptoms are those of an ulcerated area subject to insult: Dull pain and burning, much aggravated by walking or moving about, the profuse and acrid discharge, and some loss of strength from the presence of ulcerated and infected tissues. There are few constitutional symptoms though some backache may be present.

Treatment.—The treatment of chronic vulvitis is based upon the dispersal and destruction of the bacteria lurking in the depths of the uterus, and stimulation of the sluggish reparative processes, so that ulceration, congestion and tissue hyperplasia are prevented.

If the case be a mild one, repeated painting of the affected area with 2 per cent solution of mercurochrome together with cauterization of any little ulcers which may be present, with the lunar caustic stick, is usually sufficient.

When there is much thickening and induration of the vulvar folds, twenty-four hours of continuous application of compresses wet with a saturated solution of magnesium sulphate followed by painting with mercurochrome or with 5 per cent solution silver nitrate is advised. Should the discharge continue, there should be instilled into the vagina about 2 drams of a powder consisting of equal parts fullers' earth and sodium bicarbonate. Irritated labia should be kept apart by a strip of gauze or probably lint, which has been dusted with this powder.

Regulation of bowels and a hygienic regimen are important adjuvants to this treatment.

The prognosis is excellent, the most severe cases of vulvitis usually yielding to a few weeks' intensive treatment.

CHRONIC BARTHOLINITIS

The vulvovaginal glands are compound structures, composed of many small groups of acini. Infection of these various divisions separately will account for the repeated abscess formation in the same sites in different divisions of the gland. Cross infection from one gland to the other is also common, and results in repeated suppuration.

Occasionally, when the duct alone has been the seat of the infection, it becomes closed and the secretions of the gland are dammed back causing the formation of retention cysts, which may be very small or reach the size of an orange, greatly distorting the contours of the outlet.

The cysts usually contain clear, mucous material or their contents may be the chocolatelike material characteristic of old blood.

These cysts are not productive of symptoms save as their bulk causes discomfort or moving about and occasionally on defecation. They are usually unilateral, but a few instances of bilateral cysts have been reported.

Treatment.—The treatment both for chronic bartholinitis and retention cysts is excision of the glands and ducts, as has been described in the consideration of the acute form of this lesion.

It is better to incise and drain an abscess in this gland and subsequently to perform the formal excision, than to attempt this procedure before rupture of the abscess has occurred.

While one may sometimes dissect out the unruptured abscess, this is usually impossible and the incision and entire operative field becomes soiled with pus.

CHRONIC URETHRITIS

In women, gonorrheal urethritis tends to chronicity and to spontaneous cure, although in many instances the infection remains more or less latent and is ever a potential source of danger, both by reason of the power of the urethral discharge to reinfect other portions of the patient's genital tract and because sexual congress may readily infect the partner even though years have elapsed since the primary attack. The everted, swollen mucosa of the acute period has disappeared, the only remaining sign being a greater or lesser amount of induration about the meatus and a distinct reddening of the mucosa. The orifices of Skene's glands are prominent and on pressure a droplet of pus can usually be expressed from them. Gonococci may or may not be demonstrable in the scanty discharge, but may usually be found upon painstaking examination.

Symptoms.—The symptoms of chronic urethritis are very indefinite and mild. Some little burning on urination, frequently after exposure to cold, or possibly a little tenesmus, are the discomforts generally described by the patient.

Detailed investigation of the outer portion of the urethra with special reference to Skene's glands should always form part of the examination of a patient in whom any suspicion of gonorrhea exists.

Diagnosis.—The diagnosis is based upon the thickened, congested appearance of the mucosa about the meatus, the finding of swollen, elevated orifices of Skene's glands from which a small amount of pus can be expressed and the demonstration of gonococci in smears, together with a history of an acute attack of urethritis, no matter how mild.

Treatment.—The management of chronic urethritis in women is based upon the destruction of bacteria and the restoration to normal of thickened, indurated periurethral tissues.

Skene's glands being the refuge for gonococci in their depths, must usually be destroyed in order to eradicate such habitats of organisms. The technic of this procedure has already been described under the management of acute urethritis.

The chronic inflammation of the urethral mucosa is best combated by the use of silver in one or the other of its salts. Silver nitrate up to 5 per cent strength, protargol up to 5 per cent and argyrol in from 10 to 30 per cent solutions are the agents principally employed to destroy the organisms. The silver salts should be gently injected into the urethra, care being taken that no undue force is used and that the injection is not forced into the bladder.

Bougies of gelatin base, impregnated with silver salts or with other astringent metals, as copper sulphate 1 per cent, zinc sulphate 1 per cent, are of value as they melt slowly in the warmth of the urethra, and the medicament is in contact with the infected mucosa for a long time.

URETHRAL STRICTURE

Stricture of the female urethra is of comparatively infrequent occurrence as a major lesion, but stricture of moderate degree is fairly common and gives rise to vague symptoms, as bladder irritability, frequency of micturition, pain in the cystic area and even sometimes a suggestion of renal lesions.

Although the condition was known to the ancient physicians, Fabricius mentioning it as a possibility, the first accurate description of stricture in the female urethra is that of Lisfranc, in 1824. That a lesion so common should have inspired such a paucity of medical articles predicates the fact that the symptoms are rarely definite and the occasions for treatment not marked. A most comprehensive paper by W. S. Pugh has appeared ("Strictures of the Female Urethra," *J. Am. M. Ass.*, 1926, 87:1790), which deals fully with the subject and will be freely drawn upon here.

The etiology of stricture in women has been variously considered as trauma, particularly birth injuries, neoplasms, catheter injury and focal infections. The great causative agent probably is the gonococcus, since about 80 per cent of all cases of gonorrhea in the female present evidence of a urethritis occurring at some stage of the infection.

Symptoms.—The symptoms are dysuria, urgency and frequency with sometimes signs of a toxemia present. The symptoms are rarely definite and more rarely is the stricture marked enough to cause retention of urine.

The lesions are usually soft and yielding, thickening and infiltration of the urethral wall being uncommon.

The stricture is usually located in the anterior urethra just posterior to the meatus, for the reason that Skene's glands open in this area and as these glands are so commonly the seat of a chronic gonorrheal adenitis, the constant discharge of infective material acts as a continuous irritant to the urethral mucosa with resulting hyperplasia and stricture formation.

Diagnosis.—The diagnosis is based upon the history of a vague chain of symptoms plus the demonstration of a narrowing of the urethral lumen by the use of the urethroscope or the olivary bougie. The average normal diameter of the urethra is still in some dispute but from a group of statistics compiled by Pugh it appears that the normal ranges between 22° F. and 26° F.

Treatment.—Gradual dilatation with sounds or bougies is the method of choice. Some authorities advise rapid dilatation or avulsion, but these methods carry with them entirely too much risk of hemorrhage or such severe trauma that even greater constriction will follow the healing and coincident scar formation.

Male sounds or bougies may be utilized, beginning with the largest size which will pass the stricture and increasing two numbers a week until No. 26 may be passed without effort.

In cases of dense stricture the dilatation should be more slowly done.

If the stricture be complete or filiform, a vesicovaginal fistula may be made by a simple incision through the roof of the vagina into the bladder, under local anesthesia with 0.5 per cent novocain. With the retention and spasm so relieved, the stricture will frequently be found permeable to a small sound within forty-eight hours. Should this termination not take place, the stricture may be incised with a urethrotome as in the male.

CHRONIC ENDOCERVICITIS AND CERVICITIS

The majority of gonorrheics who fall under the care of physicians suffer from these two closely associated lesions.

In as much as practically every case of gonorrhea in women eventually becomes an endocervicitis and as the anatomy of the cervical mucosa and its glands is such as to form an ideal situation for the development and the

habitat of the gonococcus, whether active and virulent or in a condition of latency, it follows that here lies the great nidus of all chronic gonorrhea in women.

Chronic endocervicitis is notable in that while it is practically never spontaneously cured, and is always a potential center for reinfection in other contiguous tissues, it is yet provocative of such minor and vague symptoms as those usually associated with it. There is, of course, the great symptom of sterility to which disability this form of chronic inflammation so frequently gives rise.

Leukorrhea, persistent and intractable, and dull backache are the only subjective evidences of the disease of which the woman complains, although menstrual irregularity and a moderate degree of dysmenorrhea may sometimes be added. It is the writer's opinion that chronic endocervicitis is very commonly a focus for generalized manifestation of infection, as arthritis (non-gonorrheal), intestinal toxemia and the like.

Together with the teeth and tonsils, the cervix must be regarded as a fruitful source of focal infection, and chronic inflammation in this area must always be cleared up before a patient is pronounced free of such infective foci.

Pathology.—The pathology of chronic endocervicitis is the natural result of continued irritation by a long-lived pyogenic organism inhabiting a structure containing many crypts and fossæ lined with columnar or transitional epithelium.

The cervical canal in adult women is lined by cylindrical epithelium, thrown into many plications and irregularities and containing many mucous glands having various forms, from simple shallow to almost racemose types, some with very small orifices and others wide-mouthed. In these glands and between the folds of the mucosa the gonococci live in more or less activity for months and years, and as a result of their continued irritation, the mucosa becomes swollen and finally compressed from pressure. The orifices of the glands become contracted, the tissues are the seat of a small round-cell infiltration especially marked around the glands. Some of these latter become closed giving rise to the little retention cysts termed cysts of Naboth, which occasionally are noted encircling the os, and presenting as rounded elevation 1 or 2 millimeters in diameter on the smooth intravaginal portion of the cervix. When incised these cysts exude a clear, gelatinous mucus.

The entire cervix is usually somewhat hypertrophied, although in some instances it becomes atrophied and very hard and dense in consistency.

Diagnosis.—The diagnosis of chronic gonorrheal endocervicitis and cervicitis presents many difficulties and though frequently made to the entire satisfaction of the medical attendant, cannot be categorically stated unless gonococci have been demonstrated in the discharges. This medico-legal point cannot be too strongly stressed since serious consequence may ensue if a diagnosis of gonorrhea be made in a married woman whose husband declares his innocence of venereal disease, unless the statement can be supported by the actual presence of the pathogenic organisms.

The diagnosis depends upon the history, the social life and character of the patient and her husband, if she be married, having an important bearing.

Generally speaking, a resistant or long-standing cervicitis in a woman who has not a parturition laceration of the cervix or who has not had one or more abortions, practically bespeaks gonorrhea even in the absence of demonstrable organisms. If there is evidence of a previous abscess of Bartholin's gland, as shown by a scar at its site, or if an associated infection of Skene's glands can be shown, the diagnosis becomes practically assured.

The gonorrheal cervix itself possesses no definite features by which one may distinguish between this form of infection and any other, especially if the disease be of long duration and of a mild character.

Chronic salpingitis when present is another corroborative factor, unless there is a history of infected abortion or some degree of puerperal sepsis.

To make the diagnosis absolute, repeated smears should be made from the cervix, in the intermenstrual period, just preceding and just after menstruation. Failure to detect the organisms should not deter one from making repeated attempts to demonstrate them, since they may at any moment emerge from a latent into an active and demonstrable state.

Symptomatology.—It has been previously stated that no disease peculiar to women may exact such widespread effects upon her entire life as gonorrheal cervicitis and yet be provocative of so trivial a group of symptoms. Especially is this true when the infection becomes localized in the form of a chronic cervicitis and endocervicitis.

Leukorrhea, profuse and intractable, the flow thin and milky or sometimes thick and of a yellowish-green color, is the chief complaint. At times the discharge is excoriating and causes a more or less severe dermatitis about the pudendal region. Occasionally a rather characteristic foul odor is complained of and in some instances a little blood is noted from time to time.

Menstruation may be unchanged or some abnormality of this function may be noted, particularly that disorder known as interrupted menstruation when the flow starts and after being established for a day or two stops for a like time, to recur until a week or more has been occupied by a menstruation which normally lasts three to four days. Chronic, mild backache is a fairly common symptom, the pain being of the dull type which we have come to associate with focal infections and in which the cervix probably plays the part of such focus.

Sterility is so frequent in these women as to be almost the rule. Statistics upon the subject are voluminous and place the ratio of sterility to gonorrhea as anywhere from 30 to 50 per cent, and these figures do not include the large number of instances of "one child sterility" in the causation of which the gonococcus is so potent a factor. This phase of the situation will be described at length in another chapter of this work.

Treatment.—The treatment of chronic gonorrheal cervicitis forms one of the major duties of the gynecologist, and nowhere are his knowledge, technical skill and resource more strongly brought into play and nowhere in his field, except possibly in the management of carcinoma, does disappointment more frequently repay his most conscientious efforts.

It may be said at the outset that as yet there has been no definite or specific plan of treatment devised for this most intractable lesion. The entire list of local antiseptics, vaccine therapy in all of its ramifications, mechanical measures, electricity, hydrotherapy, all have been brought into play and the results are uniformly unsatisfactory.

On the other hand, a surprisingly happy termination may be brought about by mutual confidence upon the part of the patient and physician and by the persistent effort by the latter to find and apply the proper remedial agent for the individual case.

There are certain desiderata to be sought:

1. The gonococci, both surface dwellers and those lurking deep in the cervical mucosa, must be destroyed.
2. The tissues of the cervix must be restored to their non-inflammatory state, and the glands freed from exudate and cellular infiltration which continually irritate and produce leukorrheal discharge.
3. The upward extension of the disease must be prevented.

These principles are simple of statement but immensely difficult of attainment, although adherence to certain general rules of therapy will aid in this respect.

Since the cervical structures are already suffering from long-continued irritation, no violent or drastic germicides should be employed, as such measures maintain and even intensify the irritation and chronic congestion.

Little or no trauma should be produced by efforts at treatment for the reason just given.

Douches or instruments should not enter the uterine cavity or reach beyond the internal os, for neglect of this precaution may readily lead to upward extension of the infection.

In order to be at all efficacious, germicides must be applied directly to the surface of the cervical mucosa and the thick tenacious mucus which covers the tissue must be carefully removed before attempting local medication.

Good exposure of the cervix through the largest bivalve speculum that can be painlessly inserted into the vagina is an absolute essential to successful treatment.

The germicides utilized for the destruction of gonococci, *in vivo,* comprise almost the entire list of these agents, all of them having been tried and each having its advocates. But two have stood the test of trial and time and outweigh in value all of the others, namely, the salts of silver and the comparatively new mercurochrome, though this latter is far inferior to the silver salts for this purpose.

Silver nitrate in fresh aqueous solution and of strength varying from 5 to 20 per cent still remains the most efficacious and satisfactory drug for the destruction of gonococci in our formulary, and properly applied almost always greatly reduces the inflammation even though permanent cure remains a matter of more or less doubt. The colloidal silvers, marketed under various trade names, are also of great value, particularly when the inflammatory reaction is severe and the more irritating silver nitrate is contra-indicated. The escharotic germicides and antiseptics, such as pure carbolic acid, zinc chlorid and the like, have but little place in the therapy of chronic endocervicitis save to cauterize ulcers and indolent granulations, if such be present.

The actual cautery is an instrument of the greatest value in dealing with endocervicitis especially when there is erosion or an exfoliation of mucosa about the external os. It also serves well to puncture and destroy the nabothian cysts which so frequently encircle the os.

Recently, intense heat has been employed as means of destroying gonococci *in situ.*

Corbus has devised an instrument for the treatment of gonorrheal endocervicitis by heat which he calls the cervical thermophore. It consists of a very thin nickel-silver shell, closed at one end, and measuring 5 millimeters in diameter. A hard rubber sheath, 15 centimeters long and 1 centimeter in diameter, is attached, thus allowing an extension of 4 centimeters for insertion into the cervical and urethral canal. An insulated terminal is provided for attachment of the cable, supplying current. A thermometer is inserted to the full depth of the shell and a reading is taken from the exposed portion. Any diathermy machine which is capable of supplying 800 to 1000 milliamperes will produce heat enough for the thermophore. With the patient in the lithotomy position the indifferent electrode, 4 by 6 inches in size, is placed over the suprapubic region, a gauze pad saturated with hypertonic salt solution being imposed between the electrode and the skin. A vaginal speculum is inserted and the cervical canal and vagina are cleansed with alkaline swabs. The active electrode is then placed in the cervical canal and anchored to the speculum to insure its being held in place. The contacts are made and the current is gradually turned on. When the thermometer registers 116° to 117° F. (46.5° to 47° C.), the current is stabilized and this degree of heat is continued for thirty to forty minutes. The treatments are repeated every week or ten days. Between treatments the patient inserts a wire vaginal bath speculum and remains in a hot bath for a half hour two or three times a week. This method is contraindicated during pregnancy, in the early acute stages of infection or when evident active pelvic inflammatory changes, such as salpingitis or pelvic cellulitis, are present. Corbus has used this procedure for four years and has satisfied himself that it brings about a permanent and complete elimination of the gonococcus.

The technical details of managing a case of endocervicitis are worthy of some consideration.

It being assumed that the diagnosis has been reached, by the history, the clinical evidence and the demonstration of indubitable gonococci in the discharge, the patient is instructed to report for treatment twice weekly, if this be possible; once weekly, if circumstances interfere.

With the patient in the modified lithotomy position, her feet in stirrups, the cervix is exposed by the introduction into the vagina of the largest bivalve speculum that can be borne with comfort. By a little manipulation the cervix is forced into the opening of the instrument, and is available for local treatment. The vaginal surface of the cervix and the os are generally covered by a thick tenacious mucus which is best removed

by wiping the surface with cotton coated with a solution of sodium bicarbonate in water, the mixture being made of about the consistence of thick cream.

Gentle cleansing with this solution usually leaves the vulva and vagina gratifyingly clean and dry after which the treatment may begin.

The cervical canal is slowly and painstakingly swabbed and coated with a solution of silver nitrate 10 to 15 per cent in strength. A fine applicator, its point well wrapped, is used and an abundance of solution is employed, the cotton applicators being changed several times as mucus and débris accumulate upon them. The cervical mucosa should become almost white following the silver and any excess of solution should be sponged from the vagina. Two or three drams of a mixture of equal parts fullers' earth and sodium bicarbonate should now be introduced into the vagina with a spatula or spoon, and the powder held in contact with the cervix and upper vagina with a tampon. This process is to be repeated three times weekly for two weeks and then twice weekly until cure results. The diminution of leukorrhea and the relief from pain and excoriation and burning are rapid and marked, though the destruction of the gonococci usually requires a considerable time and, indeed, is frequently not accomplished. The chronic inflammation of the cervix is greatly allayed, however, and the discharge reduced to a minimum.

In cases where the infection is more acute and the cervix presents an angry appearance, gentler therapeutic measures are indicated. Here, yeast is of great value, controlling the leukorrhea admirably, and acting as a solvent of mucus and débris.

The cervix having been cleansed and dried as before described, a small suppository is molded with the fingers from a half cake of ordinary household yeast. This suppository is inserted into the cervical canal and held in place by a cotton tampon. The treatment should be repeated every other day and is sometimes productive of excellent results.

Should the above measures fail after several weeks of conscientious application, cauterization of the cervical canal is indicated. This is a measure of immense value, but carries with it an element of danger, since, should the tissue destruction be too great, active and indeed alarming hemorrhage may result, or such a degree of cicatrization and contraction ensue that a complete stenosis of the cervical canal may result, or possibly such inelasticity of the tissue that subsequent childbirth will be attended with considerable difficulty as to dilatation of the canal.

To apply the cautery, the small nasal type of tip should be used, the

heat being maintained at a dull red. Not more than one quarter of the cervical circumference should be heated at one sitting, and the depth of the cauterization must not exceed 2 millimeters. The burned lines should begin as near the internal os as possible and be carried out beyond the vaginal border of the cervical canal. They should be parallel to the long axis of the cervix and be about 2 millimeters apart. At least a week should elapse between cauterization, preferably ten days. In most cases, this procedure can be carried out without anesthesia, but when the patient is nervous or the tissue sensitive analgesia is to be induced by the injection of a few drops of 0.5 per cent solution of novocain deep into the cervical musculature in the area to be cauterized. When the os is small and the cervix long, preliminary gentle dilatation of the canal until a 24 or 26 F. sound passes easily should be performed. Within two months the cauterized areas will be healed, when smears to determine the presence of gonococci may again be made.

Gellhorn advises methylene-blue infiltration and his method is here quoted in full (George Gellhorn, *Non-Operative Treatment in Gynecology,* New York, D. Appleton & Co., 1923, p. 92):

"*Methylene Blue Infiltration.*—The principle of the method is to reach and destroy the gonococci in the very tissue where they reside. The following points are pertinent:

"The cervix is exposed in a bivalve speculum and steadied by a volsellum or sharp hook. The vaginal discharge is wiped out and a smear is taken from within the cervical canal. If this smear contains typical or suspicious diplococci or, in chronic cases with a suggestive history, an abundance of pus cells, the following solution is used:

Methylene-blue (chemically pure)....	1 gm. (gr. xv)
Normal saline solution 100	c.c. (℥ iii)

This solution is sterilized by boiling and is injected into the tissue of the cervix at the four points of the compass, parallel with the cervical canal and at the border of the mucosa and stroma, that is 0.5 cm. from the external os. The difference in consistence plainly indicates this border. For subsequent injections the points of the compass are shifted slightly, so as to avoid the sites of previous injections.

"2. Do not use long needles lest you penetrate into the tissues beyond the uterus (which has happened twice in my cases) but insert an ordinary hypodermic needle, about 3 cm. in length. Begin injecting after the needle has been inserted to its full length and continue the injection as you slowly

withdraw the needle. Use 1 to 2 c.c. at each point of injection. By choosing sharp needles and injecting the fluid slowly, very little, if any, pain is caused.

"3. Repeat the injections twice a week and note the change in the appearance of the discharge. The latter, as a rule, loses its purulent quality after the third injection.

"4. Examine smears after the cervical secretion appears microscopically normal and continue the injections as long as gonococci or pus cells are present. When smears become negative, discontinue the treatment but make microscopic examinations at weekly intervals and resume the injections, if cocci or pus cells should reappear.

"5. During menstruation the injections need not be interrupted.

"6. Four successive smears with negative findings constitute a proof of cure. One of these smears will, naturally, be taken after a menstruation. Another smear should be examined a day or two after a condom intercourse, and, finally, one after 'provocation.' It is necessary to guard against the possibility of reinfection.

"7. The average number of injections in my successful cases has been six.

"8. Discoloration of the cervix remains for a day. The color of the urine is greenish for about the same time. No ill effects on the kidneys have been noted.

"9. No douches are given during the course of observation. Any excess of methylene-blue which may escape into the vagina is kept there by a cotton tampon, or by means of kaolin insufflated after the treatment."

Many other topical applications have been advised, but the ones described are of the most value in the experience of the writer and are therefore emphasized.

In the event of none of these forms of treatment availing to control the endocervicitis nothing remains but the excision of the infected tissues, which is best accomplished by the coning out amputation of Sturmdorf.

CHRONIC SALPINGITIS

As has been stated above, the proportion of cases in which tubal inflammation develops in the course of gonorrhea cannot be accurately estimated, but in view of the fact that there is an open pathway for the gonococci from the cervix to the tube, the only bar being the plug of mucus and the change in the morphology of the epithelium at the internal os, the ratio

of tubal infection must, perforce, be very high. Several sets of statistics have been evolved but none of them appeal to the writer as having any accurate scientific basis and, therefore, no definite conjecture has been undertaken.

Pathology.—The pathology of acute gonorrheal salpingitis has already been described. The swollen, edematous tubal mucosa, quickly breaking down into local abscesses, the pus dripping for a few fours from the fimbriæ, until swelling and fibrinous exudate block its further exit, the distention of the tubes with pus and débris, and the development of a local peritonitis from the escaped purulent material with the formation of dense and widespread peritubal adhesions, all form a logical sequence to the involvement of these structures in a gonorrheal infection.

A few weeks or months after the acute attacks, the infection cools down, the organisms become inactive and the pus contained within the tubes becomes sterile. Fibrinous exudate and round-cell infiltration, however, persist, destruction of the tubes from the contraction of peritoneal adhesions becomes marked, the ovaries become enmeshed in inflammatory exudate and the entire adnexa are converted into shapeless masses densely adherent to the posterior surface of the broad ligament, to the uterus and to each other.

In cases where the infection has been less virulent or the resistance of the patient more vigorous, the pus is in large measure resorbed, the adhesions to a great extent disappear and the end result is marked by kinked and somewhat enlarged tubes, studded with hard, fibrinous nodules, the nodules of Hegar, which more or less effectually block the passage of the ovum to the uterine cavity, even though the sealed fimbriated extremities of the tubes be opened by the healing of the inflammation.

On microscopic section of a pyosalpinx all the coats of the tubes are found to be involved in the destructive process. The delicate convolutions of the mucosa are masses of exudate and necrotic epithelium. The muscular wall is studded with small scars of old abscesses, some of them still containing caseous pus, and the serosa is thickened and covered by adhesions, a dense round-cell infiltration pervading the entire structure.

Symptomatology.—An acute attack of salpingitis with pelvic peritonitis usually precedes the chronic stage and a history of such illness may generally be elicited.

Sometimes, however, the acute phase is entirely wanting, the inflammation beginning and continuing as a low-grade process of a more or less chronic nature from the onset.

The prominent symptoms of chronic tubal inflammation are (*a*) pain, (*b*) menstrual irregularity, (*c*) digestive disturbances, (*d*) endocervicitis, (*e*) sterility, (*f*) systemic disturbance.

The pain of salpingitis is fairly characteristic. A dull ache in one or both iliac fossæ, with associated pressure pains down the inner side of the thighs and sometimes in the external genitalia. The pain is aggravated by exertion, coitus, constipation and the onset of menstruation, and varies greatly in severity as the patient is fatigued, or refreshed by rest. From time to time a little leakage of pus occurs from the fimbriated extremities of the tubes with a moderate elevation of temperature, leukocytosis, acute lower abdominal pains, in a word the evidences of a small, localized peritonitis.

Menstrual irregularities are the rule. The congestion about the uterus, ovaries and tubes, both active and passive, which is always present, added to the fact that in many instances the surface of the ovary is so imbedded in adhesions that ovulation is rendered impossible, make disturbances of menstruation almost the rule in these cases. Amenorrhea, dysmenorrhea very frequently, menorrhagia and metrorrhagia may all occur, sometimes in combinations in the same patient.

Digestive disturbances are common. Gas and meteorism, intestinal colic and persistent hyperacidity are the forms usually noted. Constipation is the rule and pain on defecation, especially if there be any slight impaction, is a usual complaint when the infected tubes occupy the culdesac thereby causing an irritation.

Endocervicitis is practically always present and conforms in all respects to the usual manifestations of this lesion as set forth above.

Sterility either absolute or of the one child type is a frequent concomitant of gonorrheal salpingitis. The process is a mechanical one, the closed fimbriæ and the damaged tubal canals preventing the passage of the ovum.

Systemic disturbances not infrequently follow gonorrheal salpingitis, the diseased tubes forming foci of infection from which develop the various forms of arthritis, cardiac irregularities and so on, which we have come to associate with focal infection.

The symptomatology of gonorrheal salpingitis varies, naturally, with the virulence of the invading bacteria, the age of the lesion and the resistance of the patient. It is always a severe disease, usually eventuating in the complete destruction of the adnexa, although such marked reaction is not necessarily the case.

Prognosis.—The outlook with regard to fecundity in this disease is bad, as the various operative procedures designed to restore the potency of diseased tubes have proved to be conspicuously unsuccessful.

Restoration of the patient to health may be confidently predicted, however, sometimes by absorption of the suppurative material and the resulting exudate, more often as a result of appropriate surgery. The mortality should be low, not more than 1 per cent or even less. Here again, individualization of the case and painstaking treatment are the key to success.

Treatment.—The management of chronic gonorrheal salpingitis has caused considerable dispute among gynecologists. Whether radical or conservative surgical measures are to be applied as soon as practicable after the acute attack has subsided, or whether attempts to promote resorption of the inflammatory exudate are productive of better end results, is still a subject for some debate.

It would seem that in the past, operative interference has been too prompt and recent experience has shown that non-operative measures result in complete disappearance of adnexal pathology and lead to the restoration of fertility in many instances where formerly radical excision seemed the only curative procedure.

During the acute stage of salpingitis, only the most general expectant treatment is advised, as has been previously set forth.

When the pain has subsided, the temperature remains normal for one week and the leukocyte count approaches the normal, active treatment may be instituted. Until this stage of the disease has been attained, any attempt at local treatment spells disaster. Before resorting to surgery, absorption therapy should always be given a trial, the proportion of excellent results amply compensating for the time lost in the unsuccessful cases. Prolonged rest in bed—five or six weeks, as an average—is essential. Slow, very hot douches of a mild antiseptic solution, as saturated boric acid solution, 1 per cent lysol or a simple alkali, as 10 per cent sodium bicarbonate, given at a temperature of 110° F. and with sufficient pressure to have a distinct massage effect, are of great value, both for clearing the tubes of suppurative material and for the absorption of the pelvic cellulitis which is an almost constant accompaniment of salpingitis during the early weeks of the chronic stage. The oral administration of tonics and hematonics is an important auxiliary measure. Iron, quinin and strychnin or arsenic in combination are the drugs most generally used. The elixir of iron, quinin and strychnin is a great favorite of the writer and is of undoubted benefit. Protein therapy, *q.v.*, is of great value in this connection.

After all medical and non-operative methods of treatment have failed and the patient retains her disability, operative interference is indicated. It must be emphasized that gynecologists have been too prone to operate upon cases of salpingitis without first exhausting the less radical modes of treatment. It is true that among working women, for whom even a short period of disability is a serious consideration, there is often not sufficient time for the prolonged treatment required for non-operative relief and in such instances it is best to have recourse to surgery as the procedure of choice.

The decision as to what type of operation is to be performed for the relief of gonorrheal salpingitis requires the greatest study of the individual case since one is confronted by such directly opposing facts. Since the inflammatory process is widespread and extremely destructive, the uterus usually participating in the infection to a greater or less extent, radical operation, with removal of diseased tubes, ovaries and the fundus uteri offers the greatest hope for cure. This is true, since the victims of gonorrheal salpingitis are usually young women with their lives before them, surgical sterilization and the removal of the gonads with the endocrine and nervous changes that follow, seems an alternative to be avoided whenever possible.

Conservative surgery, the freeing of peritubal adhesions, the resection of a diseased portion of a tube or possibly complete salpingectomy on one side with an attempt to conserve, if possible, the less affected side, is probably the procedure of choice, but even here the results are by no means uniformly good. Pains and pelvic disability, with or without sterility, are all too often the portion of the woman who has undergone conservative surgery for the relief of this disease.

There is no more perplexing or unsatisfactory problem in the whole realm of gynecology than that of the young woman in her twenties, who is suffering from a well-marked chronic salpingitis, and since any variety of surgical intervention is likely to eventuate in an uncured patient, the writer proposes to exhaust all non-operative forms of treatment before resorting to operation. When laparotomy does prove absolutely necessary, however, total ablation of diseased tissues offers the greatest hope of success, which success becomes much more certain as more and more healthy ovarian tissue may be retained. The inevitable sterilization attendant upon bilateral salpingectomy, while undesirable, is nothing in comparison to the importance of maintaining the menstrual function of the ovarian hormone.

The details of operative technic have no place in this volume, since they may be found in great detail in any work on gynecology.

The time of operation, however, is most important, experience having shown that the attempted removal of pus tubes at any time while the infective bacteria are active and virulent is fraught with disaster.

The old rule of Simpson probably makes for the greatest safety. This rule insists that the temperature shall have been normal for one week after which a thorough bimanual examination is made, and if after this the temperature and leukocyte count do not rise for twenty-four hours, operation may be performed with safety as regards a spreading peritonitis following.

As the general condition of the patient improves, hydrotherapy, exposure to sunlight, at first in bed, then in a chair, and finally short slow walks in the open, will aid in the restoration of health. Sexual intercourse is to be absolutely interdicted for several months, and constipation controlled by the use of mild laxatives. The gentler salines, as sodium phosphate in dram doses before breakfast, are especially indicated.

With full coöperation between physician and patient, untiring attention to the details of systematic upbuilding and unwearied patience, it is surprising how many cases of seemingly permanently damaged tubes may be restored to their full functional status, with a complete amelioration of all symptoms.

CHAPTER XIV

GONORRHEA IN PREGNANCY, LABOR AND THE PUERPERIUM

PREGNANCY

Gonorrhea and pregnancy may be coexistent under three conditions.

1. The gonorrheal infection may antedate the occurrence of impregnation.

2. The gonorrhea may have been acquired at the same coitus which resulted in conception.

3. The gonorrhea may have been acquired after conception has occurred.

In cases belonging to the first group, and including by far the greater number, the infection has passed its acute stage and is chronic, the organisms being limited to the deep tissues of the cervix, bartholinian glands, and possibly the endometrium and the fallopian tubes. The latter two groups of cases contain the acute and subacute forms of the disease.

The frequency of gonorrhea during pregnancy has been greatly exaggerated, the older European statistics of from 18 to 50 per cent incidence of the disease in pregnant women being not at all borne out by investigations in this country. Taussig, Harrar and others state that about 5 to 10 per cent of parturient women have gonorrhea, but even these figures are far too high if applied to a cross section of the population. Obviously in dispensary services, especially where the proportion of colored women is very high, the incidence of venereal disease will be correspondingly increased, but when the patients are drawn from all classes of society, it would seem that an incidence of about 2 per cent would be more nearly correct.

When may a gonorrheic woman undertake pregnancy? This question is a very common one, when a married woman has been treated for the disease or when a former patient, having married, is desirous of becoming a mother.

As a general rule, the criteria of cure previously outlined will serve as a guide, although the writer is content with three negative smears at one month intervals, taken as follows:

A cervical or urethral smear in the intermenstrual period, one on the day following cessation of the menstrual flow and one five days later. These three smears being negative, the same process is repeated after one month, and if again negative, the patient is regarded as safe to undertake reproduction.

The influence of pregnancy upon a preëxisting gonorrhea is usually quite marked. The congestion and succulence of the tissues which are a part of the gravid state furnish abundant stimulus for the rapid multiplication of gonococci, whether the organisms are of recent introduction or have been present for a long time.

In this manner, an old, latent gonorrhea, the existence of which is ofttimes entirely unsuspected by the patient, may flare up and give rise to active symptoms.

Pregnancy seems to predispose to a widespread upward extension of the disease, since endometritis and deciduitis are not infrequent, and the invasion of the tubes occurs quite often, as may be shown by the many instances of acute salpingitis during pregnancy, the tubes often being found completely occluded at their fimbriated extremities.

The influence of gonorrhea upon pregnancy is not usually so marked. Abortion may and does occur as a result of endometritis or deciduitis. But it is by no means the rule. The gonococcus is a fairly negligible factor among abortifacients, its great rôle in this connection being that of a causal factor in sterility. If there be an associated endometritis present, malformation of the fetus may occur as a result of faulty implantation of the ovum.

Puerperal sepsis is an all too common complication of neisserian infection, although fortunately gonorrheal sepsis is more generally productive of morbidity than mortality, its usual manifestations being a prolonged and stormy puerperium.

Pure gonorrheal sepsis is uncommon, but if the infection becomes mixed, the streptococcus, staphylococcus or colon bacillus being superimposed upon the original gonorrhea, serious lesions of the pelvic tissues almost invariably follow.

Symptoms and Diagnosis.—The symptoms of gonorrhea during pregnancy are those of the disease in general, although made more severe by the congestion present.

The diagnosis is usually easy. In the great majority of cases, when the disease is recognized as having been preëxistent to the pregnancy, a history will be volunteered in the interests of the child. In all cases, the advent of pregnancy is attended by a leukorrhea more or less profuse. The discharge varies from white to greenish-brown in color, it may or may not be offensive and, on microscopic examination, it presents the characteristic gonococci in varying numbers. If the infection be acute and severe, there will be a marked congestion of the vagina with burning pain, and even occasionally some exfoliation of the vaginal mucous membrane, with serous discharge or slight bleeding.

Sometimes the urethral infection is rekindled by the congestion about the pelvic tissues with purulent discharge from the meatus and frequent micturition. If the internal genitalia have been involved there may develop a mild pelvic peritonitis of low-grade type. In most of the cases, however, the chief symptom is the profuse and intractable leukorrhea.

Condylomata, if present, undergo very marked and active growth and become extremely vascular. Indeed, these growths spread with such speed and become so numerous and large as often greatly to alarm the patient. Excision, which sometimes becomes necessary, is made difficult by the vascularity, hemorrhage becoming very severe in some instances. Ligation of the base of pedunculated condylomata, and removal of sessile growths by fulguration under local anesthesia, will usually be sufficient safeguard against this combination.

Various remote complications, as arthritis, endocarditis and sometimes general peritonitis, are noted during pregnancy with rather more frequency than among non-pregnant women.

Treatment.—During pregnancy the local treatment should follow the general line of gonorrhea therapy, with the exception that large douches or vaginal tampons should not be employed.

If the disease be acute and present itself as a violent inflammation of the vaginal mucosa and the cervix uteri, frequent applications of a fairly strong silver solution are indicated. A good practice is to thoroughly coat the vagina with a solution of silver nitrate, 20 grains to the ounce, at two-day intervals, a cleansing douche to be used by the patient on the alternate days. The douche should be mildly antiseptic, small in amount (not to exceed 1 quart), and given with practically no pressure of the stream, 0.5 per cent formalin making an excellent solution for this purpose.

Abscesses developing in Bartholin's glands must be evacuated under local anesthesia and the cavity thoroughly disinfected with a strong silver

nitrate solution or pure iodin. Such a plan of treatment will usually control the more violent type of infection.

Where the gonorrhea presents itself in the usual chronic form, manifested only by a profuse leukorrhea with a moderate thickening and congestion of the vaginal mucosa, treatment by means of the instillation of a drachm of brewer's yeast or the dry yeast spores marketed under several trade names, offers the greatest hope for relief.

The applications should be made every other day, the yeast held in place by a small pledget of absorbent cotton, placed just within the vulva, not in contact with the cervix. Cleansing douches, as outlined above, should be used on the alternate days. Gentleness of manipulation and avoidance of pressure on the cervix or fundus uteri are essential to success.

Should a pelvic peritonitis supervene, absolute rest in bed and the application of heat, together with the ordinary general therapeusis of infection, is the plan of treatment to be followed.

The use of antigonorrheal vaccine or serum has been advocated and some good results reported, but I personally feel some hesitation in administering sera during pregnancy, fearing a pronounced reaction with injury to the embryo.

LABOR

Nowhere in the domain of obstetrics do the skill and judgment of the accoucheur meet a greater test than in the conduct of a gonorrheal labor.

If the patient is to be spared the prolonged morbidity and the risk of death from a puerperal septic infection, two essentials must be observed: There must be a minimum of traumatization of the genitalia, and there must be absolute asepsis, that no complicating organisms may enter the birth canal.

How are these desiderata to be obtained?

In the first place, labor must be spontaneous if possible. Hasty intervention with forceps or version are to be avoided, as are manipulation and massage of the uterus and Credé expression of the placenta. These latter procedures are at best of doubtful value and are distinctly contra-indicated in the presence of gonorrhea.

Vaginal examination should be minimized in these cases. All necessary information regarding dilatation of the cervix, presentation, degree of engagement, progress of labor, etc., may be easily elicited by rectal touch, and the vagina thus remain entirely unused as an avenue of examination.

Obviously, all precautions with regard to the cleanliness of the external genitalia should be put into practice. Removal of the pubic hair, and if necessary, by reason of infection, painting of the labia and the site of Bartholin's glands with a strong silver solution should be done.

An excellent procedure, and one much utilized by the writer, is to thoroughly drench the vagina with a 10 per cent solution of argyrol early in the first stage of labor, 1 or 2 ounces of the solution being introduced with a rubber or glass syringe. As labor progresses, the injection is repeated, the child passing through the birth canal in a practically continuous bath of silver solution, and emerging with its skin darkened by the drug, the eyes having already received a preliminary application of the salt.

After delivery, the keynote again is gentleness of manipulation, exploration of the uterine cavity and fundal massage being especially contraindicated. Repair of lacerations should be quickly done, while, if the injuries are extensive, the intermediate (sixth to eighth day postpartum) repairs offer excellent results.

Prophylaxis against Ophthalmia Neonatorum.—One cannot dismiss the subject of the conduct of labor in a patient known to be a victim of gonorrhea, without reëmphasizing the absolute necessity of prompt and thorough prophylaxis against that scourge of humanity—ophthalmia neonatorum!

No improvement has been made upon the original recommendation of Credé that 1 drop of a 1 per cent solution of silver nitrate freshly prepared, be permitted to remain in the eye one minute after which it is to be flushed out with normal saline solution.

Simple as the procedure may seem, there are several essentials without which it loses much of its usefulness.

First, the treatment must be instituted immediately after the birth of the child, before the gononocci have had the opportunity of sinking beneath the surface of the epithelium and so rendering the silver innocuous to themselves.

It is the practice of the writer to have the instillation made with a sterile medicine dropper, as soon as the head is born, in these cases, before the shoulders have been delivered. Entirely too much time is lost in general hospital and private home practice, before the germicide is applied.

Second, one must be very certain that the silver actually comes into contact with the conjunctiva, and is not wasted upon the eyelid. To this end the obstetrician himself should separate the lids by means of the

fingers covered with moistened pledgets of cotton, while under his inspection the assistant or nurse instills the solution.

The milder silver salts, protargol, argyrol and the like, now commonly replace the silver nitrate, as they are less irritating, and do not require to be neutralized by salt solution.

In the employment of these agents, the conjunctivæ are freely flushed with a solution of from 5 to 10 per cent strength, care being always taken that the drug really comes into contact with the conjunctiva.

If, in spite of proper prophylactic care, ophthalmia should develop, the most prompt and active measures must be taken to minimize the damage. Hourly flushings with warm boric acid solution, continuous cold compresses, made by laying many little circles about 2 inches in diameter of eight thicknesses of gauze upon a cake of ice contained in a basin, and applying the compresses to the afflicted eye continuously, replacing with a fresh cold one at from five to ten minute intervals.

Argyrol in 10 per cent strength three times daily and atropin to dilate the pupil, are the essentials of the treatment.

Proper prophylactic care, however, will so reduce the incidence of ophthalmia neonatorum that careful obstetricians often go through long years of practice without having observed the development of a case.

PUERPERIUM

Puerperal Sepsis.—It has been shown repeatedly that the gonococcus is frequently present in the generative tract during pregnancy and labor, and that it plays an important part in the causation of puerperal sepsis. Attention has previously been called to the importance of this organism in the pathology of deciduitis and endometritis causing abortion.

Puerperal sepsis due to the gonococcus is usually mild in type, the pyrexia moderate and the extension of an endometritis to the tubes or pelvic peritoneum very common. A peculiar characteristic of this form of sepsis is the rapidity with which symptoms develop after delivery. These are the cases wherein the temperature rises within twenty-four hours after delivery and the patient is quite ill with abdominal pain and tenderness and evidence of peritoneal irritation within thirty-six hours.

Sepsis due to the introduction of bacteria from without is usually delayed in onset until the third day after delivery or even later, when the infection manifests itself by a chill with marked rise of temperature. In gonorrheal sepsis, on the other hand, there is usually a prompt and

moderate rise of temperature with the chill as a somewhat uncommon manifestation.

Gonorrheal bacteriemia is extremely rare, whereas in cases of sepsis due to the streptococcus or staphylococcus, blood stream infection is quite common.

The lochia is apt to be foul and fairly free and in most instances gonococci may be demonstrated in the fluid.

The pulse rate is usually in consonance with the temperature, neither being inordinately high. Indeed, it has been stated (Berman) that a high temperature predicates the presence of organisms other than the gonococcus. Occasional instances are recorded, however, in which an apparently pure gonorrheal sepsis develops a very marked hyperpyrexia.

The other symptoms—meteorism, restlessness, constipation or diarrhea, subinvolution and loss of bodily weight—are only characteristic of puerperal infection as a whole and are of no significance in the determination of the offending organism.

There is a marked tendency toward localization in sepsis of gonorrheal origin, salpingitis, abscess of the uterine cornua, and pelvic cellulitis eventuating in pelvic abscess being common sequelæ.

There is a moderate anemia with some leukocytosis.

The *prognosis* of gonorrheal puerperal sepsis is generally good. As has been said, infection by this organism is the mildest of all the varieties of sepsis, and since bacteriemia is rare and localization common, the results are usually excellent, though if the patient has suffered from severe hemorrhage, or the infection becomes mixed, grave illness and fatality are certain to occur.

Treatment.—*Prophylaxis.*—When gonorrhea is known to complicate pregnancy, every attempt should be made to minimize the number of gonococci in the vagina or cervix during the last weeks of pregnancy, so that the patient may enter into labor as nearly free of the organisms as possible. Personal experience has shown that douches are useless for this purpose and serve only as a possible means of driving infective material from the lower birth canal up into the uterine cavity.

The plan followed by the writer in his service at the Philadelphia General Hospital where many gonorrheics are delivered annually is as follows:

The patient is hospitalized one or two weeks prior to term, and on alternate days is placed in the lithotomy position, the vulva gently washed with soap and water, the vagina and cervix lightly sponged with a pledget

of cotton saturated with a solution of sodium bicarbonate of creamy consistence. This alkaline sponge thoroughly dissolves and removes all mucus and the tenacious discharge from the infected cervix. The vagina is then gently dried with cotton swabs after which its entire surface as well as the cervix is painted with an 8 to 10 per cent solution of silver nitrate, care being taken not to enter the cervical canal and so possibly precipitate labor. On the intervening days the patient is given a vaginal injection of one ounce of a 20 per cent argyrol solution, injected with a rubber or glass syringe, the patient assuming a recumbent position which is maintained for twenty minutes, after which she is allowed to rise, the excess silver solution being allowed to drain into a bedpan or toilet. When labor is well advanced, the vagina is filled with argyrol solution as before described. By the employment of this very simple technic, ophthalmia has been absolutely prevented in the author's experience, although the Credé eye prophylaxis is invariably practiced.

The general policy of the conduct of labor in gonorrhea is of immense importance.

If one considers that in this disease the depths of the cervix, Bartholin's glands and possibly the tubes are the seat of a potentially virulent infection, which is, or rather may be, more or less latent during pregnancy, it becomes apparent that the less traumatization of these tissues, the more is the hope of preventing a lighting up of the active phase of the infection.

Furthermore, since the causative factors are present at the vulvar outlet, in the orifice of Bartholin's glands and in the intravaginal portion of the cervix, vaginal manipulation must be attended by a certain degree of danger of carrying the organisms into the uterus, from below upward.

Vaginal examination, therefore, should be reduced to a minimum and always be carried out under the most scrupulous surgical asepsis and with the utmost gentleness.

It is in this group of cases that rectal examination finds its field of greatest usefulness and its employment is strongly recommended.

Labor should be allowed to proceed spontaneously whenever possible, all hasty intervention with forceps or version being untimely. Constant attention to the fetal heart will permit many labors to be terminated spontaneously which under other circumstances would ordinarily be ended by operative measures.

Only when a direct and insuperable indication for instrumental or manual delivery exists, should these methods be brought into play in a gonorrheal labor.

The child having been delivered, gentleness and abstinence from handling tissues should again be the rule. Vigorous massage and compression of the uterus, detailed exploration of the vagina and cervix, packing, or any other unnecessary trauma are to be studiously avoided.

If lacerations occur they must be repaired, and in these cases the intermediate repair is of great value.

Curative.—No matter what its origin, the management of puerperal sepsis, when it has been established, may be considered under the heads of local treatment, general systemic measures, and the methods of sterilization of the blood stream, to which may be added operative procedures. In as much as most cases begin as an endometritis of some kind, local treatment was long held in high esteem and many instruments have been designed to facilitate the removal of necrotic material from the uterine cavity. Happily, this erroneous treatment has generally been abandoned since it has been shown that attempts to remove the infected endometrium are usually fraught with disaster.

The only barrier between the bacteria-laden decidua and the blood stream lies in the zone of granulation tissue which rapidly forms and which may maintain localization of the disease process.

Instrumental emptying of the uterus, no matter how delicately performed or how blunt an instrument is used, is certain to break down little areas of this granulated tissue, thus opening the great uterine blood spaces and the retroplacental thrombi to bacterial attack.

Furthermore, since the infection has become general, at least in a measure, within a few hours after the implantation of the causative organisms, it is of no therapeutic value to remove the original site. De Lee has well said that it is as logical to curette the fauces in diphtheria as the uterine cavity in sepsis.

It is the belief of the writer that the curet, the placental forceps, and even the gloved finger have no place in the treatment of septic endometritis in the puerperium. How then shall we reduce the infectivity of the germ-laden tissue and what measures may we take to hasten its expulsion?

Both of these indications are best met by the maintenance of uterine contraction and the establishment of free drainage. The former desideratum may be obtained by the frequent exhibition of pituitrin and the various ergot preparations. Five drops of pituitrin at intervals of three hours and a combination of fluidextract of ergot, fifteen drops, with strychnin sulphate, $\frac{1}{30}$ grain, three times a day, may be of value. An ice-

bag over the lower abdomen relieves congestion and facilitates contraction.

Drainage is best established by postural methods. Raising the head of the bed about 16 inches and encouraging the patient to change her position frequently, lying now on one side and now on the other and occasionally turning on her abdomen for a short time, will best serve this purpose. Some obstetricians prefer the Fowler bed, but the discomfort suffered by the patient and her comparative bodily immobility far outweigh any advantage gained.

Septic material accumulating in the vagina must be removed by gentle irrigation at frequent intervals—at least twice, usually four times daily.

In certain cases where the infection remains apparently localized in the uterine cavity, but shows no tendency to resolution, attempted sterilization by Dakin's solution is occasionally attended by surprisingly good results. This method was strongly advocated some years ago by Sherman, of Pittsburgh, who introduced a small rubber tube perforated with minute openings (the regular Carrel-Dakin tube) into the uterine cavity, placed a light dam of gauze about the cervix and then instilled Dakin's solution by the continuous drip method. The gauze should be changed daily and never be placed too firmly to allow free return of the fluid by seepage through it, without distention of the uterus. This plan of treatment is worthy of more general use than it has enjoyed.

No further local measures are advised. The general treatment consists wholly of procedures tending to increase resistance, combat dehydration and prevent anemia. Frequent transfusions, using small amounts of blood, are by all odds the most important feature of the treatment. Two hundred to three hundred cubic centimeters of properly typed blood transfused by the Unger direct method and repeated at three to four day intervals have shown excellent results. By this means the rapidly progressive anemia is withstood and the general strength of the patient maintained. Abundant food, such as milk, broth, meat juice, and other nourishing liquids, is a necessity and moderate doses of alcohol in the form of milk punches are most valuable.

Dehydration is met by the use of proctoclysis, sodium bicarbonate solution in 5 per cent strength being the fluid employed. Restlessness should be controlled by the administration of morphin and chloral, and the patient should spend her days in the sunshine and the open air, if this can be arranged.

Sterilization of the blood stream in the presence of bacteriemia has

been the goal of surgeons for years, many antiseptics having been employed with but indifferent success. The work of Piper of Philadelphia, using mercurochrome, has revived the hopes of those who have followed his results and seems to offer more hope of ultimate success than any plan yet devised.

While blood infection in gonorrheal sepsis is uncommon, many cases occur in which a primary gonococcus infection is rapidly augmented by the invasion of streptococci or staphylococci, bacteriemia following in a fair proportion of the cases.

Piper's technic is fully described in his original communication on this subject and is therefore briefly epitomized here.

Immediately upon the discovery of a positive blood culture, the patient is given an initial injection of two-thirds maximum dose of 1 per cent mercurochrome solution in sterile water, the dose, based upon Piper's research, being 30 c.c. for the first 100 pounds of body weight and 5 c.c. for each additional 30 pounds. Beyond 30 c.c. the dose is increased very gradually, especially if there is any question as to renal efficiency. The solution is injected intravenously with a salvarsan syringe and as slowly as may be. Within from thirty minutes to six hours there will occur violent diarrhea, red stained urine, probably very much reduced in amount, some vomiting and nausea.

There is usually a distinct chill lasting as long as half an hour and a rise of temperature to 105° F. or even higher. These evidences of reaction usually subside within forty-eight hours, after which another injection of 30 to 35 c.c. is made. Shock during reaction is met by the administration of adrenalin, strychnin, or other cardiac stimulants. Diarrhea is combated by the administration of opium, belladonna and bismuth, and the chill is treated by local external heat.

Since blood stream infections always predicate a desperate state of affairs, the clinical results of this treatment, while far from satisfactory, are by contrast with any other method so excellent that some hope is offered for at least partial success in the management of this the most distressing and fatal of all obstetric complications.

Surgical intervention is indicated only when definite evidence of localization of pus is present. The pelvic abscess is to be drained, the purulent tube and the cornual abscess in the uterine wall excised, but beyond this we have not seen any gain by surgical methods of treatment.

Considerable controversy arose some time ago regarding the excision

of the thrombotic veins of the broad ligament, but the operation has fallen into disuse, its results being in the main unsatisfactory.

Early hysterectomy has had its advocates and seems a logical plan of treatment, but since septic patients are poor surgical risks, and as the infection has probably already progressed beyond the limits of the uterine wall, the procedure has not met with general adoption.

The management of general peritonitis following puerperal infection is that of peritonitis in general. Whether one is an apostle of conservatism or of radical operative intervention, the end results are approximately the same—a frightful mortality, with only an occasional recovery to brighten the darkness of the picture.

CHAPTER XV

GONORRHEA AND STERILITY

In 1876, Noeggerath called the attention of the profession to the menace of latent gonorrhea and to its influence in the causation of sterility. From this time evidence has accumulated until to-day the disease is recognized as the greatest existing cause for unfruitfulness both in the male and female.

Statistics on the subject are difficult to formulate, especially in the United States where the national health records are still very far from complete, but all those which have been adduced prove conclusively that gonorrhea alone is responsible for from 30 to 50 per cent of all childless marriages. Arthur E. Giles ("Sterility in Women," *Oxford Medicine,* 1919) says that gonorrheal infection plays its most devastating part in causing sterility among young women. In his analysis of cases tubal disease was present in 11 per cent of all instances of sterility, but was found in 14 per cent of women twenty-four years of age and under, and in 14 per cent of those aged from twenty-five to twenty-nine years.

Thus it is shown that it is precisely at the age when the promise of fecundity is greatest that the largest number of women are denied the great promise of nature, motherhood, which is blasted forever by that preventable scourge, gonorrhea.

In addition to tubal disease, sterility is often the result of an endocervicitis or cervicitis, the acid secretions of the diseased glands destroying the spermatozoa, which are also prevented from entering the uterine cavity by reason of the masses of mucopus and débris which block the internal os, or indeed the entire cervical canal.

Should fertilization of an ovum be effected in spite of these inhibiting forces, there is the ever-present menace of abortion. The diseased endometrium offers but a poor nidus for a growing ovum, and early abortion is all too apt to occur. Furthermore, Lobenstine and Harrar feel that premature labor may in many instances be directly traceable to gonorrhea, and there is the danger of placenta prævia and premature separation as a result of defective implantation due to the underlying endometritis.

Many unfortunate cases of "one-child sterility" are directly attributed to the activities of the gonococcus, many of these women acquiring gonorrhea with the same coitus that resulted in the fertilization of the ovum. Pregnancy goes on to term but following the traumatisms of delivery, there results either a salpingitis with sealed tubes or so marked a cervicitis or endometritis that fecundation becomes impossible thereafter.

Gonorrhea in the male is really one of the chief causes of sterile marriages, since azoöspermia or dead spermatozoa so generally follow severe attacks, with epididymitis and seminal vesiculitis. Generally considered, then, from the standpoint of both partners to a marriage contract, gonorrhea in either one may be regarded as the chief bar to procreation.

Prophylaxis and Prevention.—If the above statements be true, it follows naturally that every means should be taken by the individual citizen as well as the state, to eradicate or at least reduce to its ultimate minimum, the ravages of so devastating a disease.

Strange as it may seem, efforts to this effect have been at most lukewarm and when proposed legislation is under debate, it always meets with vigorous and sustained opposition.

The sociology of prostitution has been so thoroughly discussed and the analyses of various commissions, appointed to study the whole question of venereal disease in large communities, have been so widely published that this phase of the question will not be considered here.

There remains the very large number of infections acquired by clandestine illicit intercourse and the all too many instances of innocent marital infections.

Because of the moral and ethical points involved, the whole subject of venereal diseases and their transmission has been a subject taboo for general public discussion, and to this narrow and distorted viewpoint we undoubtedly owe much of the prevalence of these diseases.

Not until the general body politic, including the church, is prepared to consider venereal diseases as precisely in the same category as any other transmissible infection, will any marked progress be assured.

Happily the frankness of expression on all topics including those of the utmost personal intimacy which has become world wide since the past war, has thrown some light into the darkness of this whole subject.

It would seem to be an appropriate time for the government to issue a pamphlet written for lay understanding covering the venereal disease question, with a full account of the nature of gonorrhea, its transmission and the absolute necessity for a complete cure before marriage is under-

taken. Such a pamphlet could have the same type of circulation as the ones now in use, issued by the Bureau of Child Welfare, dealing with prenatal care, the conduct of pregnancy and labor.

Furthermore, the extension of such laws as deal with the requirement for a physical examination, performed by an accredited examiner to be filed by both partners to a marriage agreement as a part of the license to marry, would doubtless greatly decrease marital infections.

To summarize: The whole prophylaxis against gonorrhea is a matter of education, and of breaking down the barriers of false modesty and prudery which have prevented a full and free discussion of these vital matters among those who most need the information—the adolescent and young adults of the country at large.

Actual medical prophylaxis in women is a very simple procedure. Immediately after a suspect coitus, the vulva and vagina are irrigated with a 10 per cent solution of argyrol contained in a rubber bulb or glass syringe. If a coating of the silver salt be spread on the genital tissues prophylaxis is assured. This question is a somewhat involved one from the moral standpoint, since it is true that no woman should indulge in suspect coitus, but since such practice is more or less common, some means of prevention should be known and an inquiring patient be properly advised.

Diagnosis.—The diagnosis of sterility due to the effect of the gonococcus offers but little difficulty. The presence of endocervicitis and endometritis may be determined by the diagnostic features previously described. Whether or not the sterility be due to occlusion of the tubal lumen may be definitely ascertained by the insufflation of the tubes by carbon dioxid or air, as described by Rubin, or by the installation of an iodin impregnated oil into the uterine cavity under moderate pressure.

Lastly, the elaborate procedure advocated by Huehner may be invoked to clear up the location of the factors producing failure of conception.

The Rubin test is so well known that it need not be described here. Instillation of iodin in oil into the tubal lumen, whereby the course and degree of patency of the tubes are revealed by subsequent x-ray examination, has rapidly grown in popularity. The principles of this procedure are as follows:

The patient is placed in the lithotomy position, the vagina cleansed and the cervix painted with tincture of iodin or a 3 per cent mercurochrome solution. A Rubin tube with its conical rubber cervical plug, or a flexible laryngeal cannula armed with a rubber stopper to seal the external

os and prevent escape of the oil, is then introduced into the uterine cavity, just beyond the internal os, 5 or 6 c.c. of lipiodol (a solution of 40 per cent iodin in poppy seed oil so compounded organically that no chemical process has yet been involved which is able to disintegrate it when once union has occurred) is then gently forced into the uterus by means of a Luer syringe, after which the cannula is withdrawn. An x-ray picture immediately after the injection will clearly outline the cavity of the uterus and the lumen of the tubes, and if the latter are patulous, lipiodol will be seen dripping from the fimbriated extremities. Another picture made after twenty-four hours will disclose the solution free in the peritoneal cavity, which finding at once certifies that at least one tube is patent.

Obviously the fertility of the husband should always be determined before any complicated diagnostic procedure is practiced upon the wife.

Treatment.—The management of sterility is one of the disappointing chapters in gynecology, since results even after the most conscientious treatment are, on the whole, most unsatisfactory.

Vaginitis, endocervicitis and endometritis must be eradicated by the methods before described, and when the unfruitfulness is due to one of these conditions, subsequent fecundity is fairly frequent.

When, however, tubal occlusion exists, surgery is of doubtful avail. The operation of salpingostomy with the formation of an artificial tubal ostium and suturing the tubal mucosa to the peritoneal surface, is not a very satisfactory procedure especially if the tubal obstructions be near the uterine cornua.

The procedure first proposed by Estes probably offers the greatest hope, in cases where the tubal lumen is completely obliterated. This consists in excising the tube or tubes, and suturing the ovary in immediate contact with the opened uterine cornu in the hope that ova may pass directly from the graafian follicle into the cavum uteri.

In general it may be said that sterility in the female caused by gonorrhea is very amenable to treatment if the lesions be limited to the mucosa of the uterus, cervix or vagina, but that when the fallopian tubes are involved, with occlusion of their lumen, the chance of successful therapeusis is quite remote.

CHAPTER XVI

CHILDHOOD AND SENESCENCE

GONORRHEA IN CHILDREN

In female infants and little girls, gonorrhea usually is manifested as a vulvovaginitis, a most resistant, intractable inflammation, leading to nervous irritability, exclusion from school, danger of contagion and kindred ills.

There is a current belief that most cases of vulvovaginitis in children are of gonorrheal origin, but this is by no means the case as is shown by many statistical reports. Irving F. Stein (*Surg., Gynec. & Obst.,* Jan. 1923, Vol. 43) presents a series of sixty-six cases in children ranging from three months to fourteen years of age, treated at the Michael Reese Hospital, in which 25 per cent gave a positive smear, 35 per cent in all were regarded as suspicious, while the remainder gave no bacteriological evidence of the presence of gonococci. Probably about one-half of the cases of vulvovaginitis in children are of neisserian origin, the remainder being caused by faulty hygiene, filth and the like.

The disease is comparatively uncommon among children of the better class, but extremely prevalent among poorer patients and in such institutions as day nurseries, foundling asylums and municipal and other large general hospitals. Epidemics are common and the literature contains many notable examples, as the report of Skutsch in which 236 schoolgirls were infected from the common use of a crowded bath house. Stamm (*Am. J. Obst. & Gynec.,* 1926, 11:4) describes an epidemic occurring in the Jewish Maternity Hospital, in Philadelphia, in which sixty-eight infants delivered in the institution were infected, many of them with very severe gonorrheal arthritis involving several joints. So severe was the epidemic that the entire hospital was closed for four months, the staff devoting its attention to the treatment of the infected babies. After a most painstaking investigation, the disease was traced to a colored laundress employed in the hospital, the linens evidently being the transmitting agent.

Modes of Infection.—Vulvovaginitis may be acquired during the passage of the child through the infected maternal birth canal, breech

presentation especially favoring the contamination of the infant genitalia. The vagina is sterile at birth, but within twenty-four hours contains many bacteria, staphylococci, streptococci of various species and colon bacilli. The gonococcus has been recovered from the infant vagina within a few days after birth, although such early cases are uncommon. In most instances the disease is traceable to contamination by the soiled hands of a gonorrheic mother or nurse, bath water, diapers or other linens, thermometers, toilet seats and so on. The most common age for infection seems to be about six years.

Norris discusses the effect of the old superstition that if a person affected with an acute gonorrhea can transmit the disease to a virgin, he will be immediately cured. In 1853, Wilde of Dublin reported the history of cases occurring as a result of this superstition. In 1912, Seipel (quoted by Norris) examined within six months fifty-three girls most of whom had been attacked as a result of this belief. The infectionist is usually a man although cases are recorded in which little boys were thus inoculated by a prostitute. Rape seems to play but little part in the form of attack, cure of the gonorrhea and not coitus being the desired end. Masturbation, mutually practiced among little girls in institutions, is another prolific cause of this disease.

Pathology and Symptoms.—Vulvovaginitis is rather a misnomer, since in mild cases the vagina is not particularly inflamed, while in the more severe ones not only the vulva and vagina but the cervix and urethra are also involved.

A typical vulvovaginitis at first resembles a desquamative dermatitis. The labia become swollen and reddened and partially glued together; small, acneform pustules may occur. The parts are bathed in a yellowish, greenish or white leukorrhea which varies very greatly in different individuals—scant and thin in some, copious, thick and tenacious in others. The discharge contains gonococci in the early stage, but as the disease progresses these organisms become exceedingly difficult of demonstration.

A secondary dermatitis may develop on the inner surface of the thigh and condylomata may occur, but are uncommon. In neglected cases, crusts and excoriations may be present with many small areas of erosion, and upon removal of the crusts a bleeding base remains.

The vaginal mucous membrane presents areas of intense hyperemia and sometimes small shallow ulcerations occur.

Many cases, however, are not nearly so severe and are manifested only by a complaint of itching and burning on the part of the child. A restless-

ness and a tendency to rub the vulva with the hand, if the sufferer be an infant, being the only symptoms.

There is almost always some discharge present but this may be so slight as to escape all but the most meticulous examination.

The acute stage usually lasts from one to two months, at which times there is usually a moderate elevation of temperature, 100° to 101° F., with the accompanying febrile symptoms, but as time goes on the fever disappears and the case becomes chronic.

Complications.—Urethritis, proctitis and cervicitis are the common complications and, in the opinion of the writer, the urethra and the cervix are involved in the vast majority of cases. Indeed, infantile gonorrhea presents the same pathological picture that is found in the adult, except that the vagina is much more commonly the seat of inflammation in children and in them the internal os acts as an almost perfect barrier, intrauterine infection being quite unusual.

Scomazzoni (quoted by Williams) had the opportunity of making histologic examinations of the portio vaginalis and cervix of an infant who had suffered from genital gonorrhea but who died of diphtheria. The changes in the cervix were similar to those observed in gonorrheal cervicitis of the adult and he found typically chronically inflamed glands on the external surface of the portio vaginalis.

Urethritis makes itself evident by burning and painful micturition, but the symptoms may be very evanescent and slight. Proctitis is not a common complication but is frequently met with in institutional epidemics, which at once arouses the suspicion that direct rectal infection has been effected with the thermometer, enema nozzle or other agent.

That cervicitis is usually present may be inferred from the chronicity of the disease and its resistance to treatment.

Arthritis is an exceedingly common complication, so much so that Holt states that a pyemic arthritis in a young infant is more frequently due to the gonococcus than to any other organism. In the epidemic at the Jewish Maternity Hospital before referred to, most of the cases were complicated by arthritis, in many instances multiple, 123 joints being affected in sixty-eight cases.

Ophthalmia may occur; peritonitis, general septicemia, endocarditis and bartholinitis may develop.

Diagnosis.—The diagnosis rests upon the symptoms stated above, the recovery of the gonococcus from the discharge, the development of typically gonorrheal complications, and the resistance of the disease to treatment.

In vulvovaginitis due to simple uncleanliness, antiseptic douches and attention to ordinary hygienic measures will promptly bring about a cure, whereas should the infection be of neisserian origin, it usually proves intractable even to the most painstaking treatment. Since it is often difficult to demonstrate the gonococci in children, all vaginal discharges in little girls should be viewed as potentially gonorrheal until at least three careful bacteriological examinations have proved negative for the gonococcus. When the discharge is scant, the organisms may sometimes be obtained by instilling 10 or 20 minims of a very weak solution of mercuric bichlorid (1 : 20,000) into the vagina with a small syringe or medicine dropper and then pumping the solution in and out of the syringe several times, finally extracting the fluid for examination. The solution frees the bacteria to some extent, and the mechanical flushing of the vaginal walls washes the bacteria from their lodging places among the vaginal folds and permits their being drawn into the syringe. This procedure will frequently prove of service in demonstrating gonococci when ordinary smears made with a dry cotton swab are absolutely negative.

Treatment.—*Prophylaxis.*—The contagiousness of gonorrheal vulvovaginitis renders it a very positive menace in hospitals having special children's wards and in institutions where young children are cared for.

Every little girl on admission should be closely scrutinized as to vaginal discharge or any evidence of genital disease, before consorting with the other children. Routine vaginal smears from each child admitted are a highly valuable procedure and should be always practiced. This is an important measure since Seipel showed that of 252 cases of gonorrheal vulvovaginitis admitted to a hospital, 136, or 54 per cent, were brought for some condition other than the vulvitis.

Immediate isolation of any positive case is the rule, of course, with the patient under the care of an isolated nurse, and the greatest care should be taken that all contaminated dressings be burned, and that bedpans, linens and all utensils are sterilized thoroughly before using.

Air-borne contagion does not exist, but gonorrheal vulvovaginitis is one of the most easily spread infections, and constant vigilance must be maintained if its propagation throughout a ward or nursery is to be prevented.

The parents of infected children should be advised of the infective nature of the disease and instructed concerning the danger of ophthalmia from careless handling of these cases.

Curative Treatment.—Infinite patience, persistence in the face of repeated failure, and minute attention to irksome details are prerequisites

to success in the treatment of the intractable disease. Hospital internes become discouraged, nurses skeptical as to the possibility of cure and a general attitude of pessimism is usually noted, where many cases of vulvovaginitis are under treatment. This attitude while partially justified is not entirely so, since careful and persistent treatment will cure a large number of cases.

A most important preliminary is to gain the confidence and affection of the child, as no local treatment can be successfully carried out upon a struggling, frightened patient. The therapeutic measures indicated are relatively those utilized in the management of identical lesions in the adult, with the difference that the youthful tissues are less resistant to irritating and penetrating germicides, which therefore must necessarily be used in reduced strength. Furthermore, douches and copious irrigation are impracticable because of the restlessness of the little patients. Concentrated gonococcicides in oily solution or in gelatin offer the best methods of application.

A preliminary warm sitz-bath in a 5 per cent sodium bicarbonate solution is of great value, the child, if old enough, being instructed to so move about as to thoroughly flush the vulva, or if the case of an infant, the nurse is instructed to move the patient about in order that the desired result may be attained.

In smaller children with intact hymen it is frequently necessary to incise this tissue in order that intravaginal application may be made. In larger girls or when the hymen is elastic, a Kelly cystoscope or a large urethroscope may be introduced into the vagina without traumatism and treatment carried on through this avenue.

As is to be expected, many germicides have been utilized in the treatment of vulvovaginitis. The various silver salts, iodin, mercury and phenol have all been employed with varying results.

Gellhorn strongly advises the use of 1 per cent silver nitrate in an ointment base composed of equal parts of lanolin and white vaselin. Stein, in the same base, employs 1 per cent mercurochrome, the ointment to be introduced into the vagina by means of a glass syringe, either direct or through a cystoscope if this be necessary.

The vagina is to be filled with the ointment, the excess being permitted to spread over the vulva. Injections are made daily, and Stein states that gonorrheal patients are usually cured in ten weeks and the suspicious ones in six weeks, with no recurrence in twenty cases after a year. Several pharmaceutical houses now manufacture gelatin bougies impregnated with

silver salts or mercurochrome, these being simple and practical in application.

If there is much discharge, the labia should be separated by a pledget of cotton spread with the ointment.

Vaccines are most efficacious in the experience of some observers, while not so valuable in others, but it would seem that any resistant cases should have the benefit of such treatment, which is easily carried out. If a smear or culture made early in the attack yields the gonococcus, or indeed any variety of organism, an autogenous vaccine may be made and administered in doses containing from twenty-five to fifty million organisms, the injections being given at five to seven day intervals, and continued for five weeks.

Williams advises that in every case where the gonococcus is found it should be regarded as the primary infective agent, and when it is impossible to secure an autogenous vaccine, a stock preparation may be used.

The initial dose of a stock gonococcus vaccine for a child one year old is from one to three million organisms. General hygiene is naturally a *sine qua non* of any variety of treatment.

Prognosis and Result.—Opinions vary as to the time required for the cure of vulvovaginitis, the average of a large number of observers being between three and four months. Kimball believes that the disease is more amenable to treatment in children under one year of age than in older girls, but Skutsch in some old statistics says that 43 per cent of patients in a series of 140 were unrelieved after twelve weeks' treatment, the vaginal discharge still containing gonococci.

Norris believes that four or five months is entirely too long for a cure, if the case be properly treated.

The writer confesses that in his experience considerable time has elapsed before a case should be pronounced cured, possibly because of the difficulty in maintaining the frequency and thoroughness of treatment that must be carried out if success is to be attained.

Apparent cures may readily be effected in four to six weeks, provided the local applications be carried out every second day and a full course of vaccine therapy be exhibited. Recurrences, however, are all too common and if one adheres to the rather rigid requisites of four consecutive negative smears taken at weekly intervals, with four more negatives taken at monthly intervals, without treatment, failure will reach a proportion of nearly 50 per cent. A few cases appear to be absolutely resistant to any variety of local treatment, gonococci remaining demonstrable for an in-

definite period. Such cases are best managed by a formal cauterization of the cervix, the patient being anesthetized with nitrous oxid and oxygen. The cervix is exposed through a large cystoscope or small speculum, the canal dilated with urethral sounds and then the outer mucosa lightly cauterized with the actual cautery, slender nasal cautery tips being well adapted to the purpose. At the same time, any small vaginal ulcers or erosion may also be cauterized.

Happily such cases are uncommon, most being readily or completely cured in from three to six months time.

GONORRHEA IN THE AGED

According to Norris, active gonorrhea in women over fifty years of age is infrequent. At this period sexual life is on the wane, menstruation has probably ceased and, in many, the menopause has been well established. Certain instances of prolonged sexual activity do occur and in such women infection by the gonococcus is possible even at a fairly advanced age.

It is interesting to note that even though a history of infection years before has been definitely proved, it is extremely difficult to demonstrate gonococci in women over fifty, for the reason that the disease undergoes spontaneous cure, the tissues which harbor the organisms becoming atrophic and anemic, and the great activators of the gonococcus—menstruation, abortion and parturition—being no longer present. As a result the organisms find no congenial habitat and gradually disappear. It is thought, however, that certain cases of senile vaginitis possibly have had their inception in an early gonorrheal infection, the organisms having long since disappeared.

CRITERIA OF CURE

The question of cure and of the propriety of marriage in female gonorrheics is an ever recurring one, which must be answered by the physician with the utmost care since much potential suffering and misery depend upon the accuracy of his statements.

The tests for cures have been so well set forth by J. Johnston Abraham (*Lancet,* 1924, 206: 429), that his conclusions are here quoted practically in full.

These tests depend on: (1) Clinical signs; (2) bacteriological results. and (3) possible serologic findings. The clinical signs of cure are:

(1) That there is no induration of Bartholin's glands and no signs of inflammation around their orifices; (2) that the urethra, similarly, appears normal on inspection externally, on palpation through the vagina and by urethroscopic examination; (3) that the para-urethral crypts, especially Skene's tubules, show no inflammatory signs; (4) that the vaginal introitus is normal in color with no inflamed tags or crypts around it, and that pain is not complained of when a speculum is passed; (5) that the cervix appears normal, the secretion clear and no erosion is present; (6) that the uterus and tubes, on bimanual examination, are apparently free from disease; and (7) that the anal orifice seems normal, and there are no signs of inflammation or discharge in the anal canal on passing a speculum.

Bacteriologic evidence of cure is as follows: (1) Smears taken from the urethra by means of a sterile platinum loop inserted half an inch down should be negative for pus cells and gonococci in a patient who has had a provocative injection of 1 c.c. gonococcal proteose twenty-four hours previously. The urethra should be gently massaged forward before insertion of the loop and the urine should not be passed for some hours before examination. (2) The urine held for some hours before examination should be clear acid, free from albumin and the centrifugalized sediment should contain no gonococci or pus when examined microscopically. (3) Smears taken from the orifices of Bartholin's glands and from Skene's tubules should be negative. (4) Smears taken from the cervix by means of a platinum loop should be negative for gonococci and also the pus when taken before menstruation, just after menstruation has ceased, and twenty-four hours after a provocative injection of 1 c.c. gonococcal proteose. (5) Smears taken from the anal canal should be negative for the gonococcus, since gonococci can be found there when absent elsewhere.

The complement fixation test, if positive a year after all clinical and bacteriologic symptoms have disappeared, may be neglected for practical purposes. If the clinical and bacteriologic tests are negative, they are repeated in two months, again in four months. The patient is considered cured if at the end of six months without treatment these tests are negative. A year later if the tests are still negative, she may safely resume married life.

CHAPTER XVII

METASTATIC GONORRHEA

More or less remote foci of gonorrheal infection constitute some of the very serious aspects of the disease, arthritis, endocarditis and septicemia being conditions of such severity that when they occur, they quite overshadow the original genital infection in their morbidity and mortality.

Happily, most of these remote, metastatic infections are quite uncommon, arthritis being the one exception in this respect.

GENERAL GONORRHEAL INFECTION

Gonorrhea practically always begins as a local disease and in most instances remains so, but in a certain proportion of cases the infection spreads beyond its primary focus and becomes general, the organisms being borne by the blood stream to distant tissues and organs.

Recently, the opinion has been advanced that gonorrhea may be always a general disease, of varying degrees of severity. There is no direct evidence to prove this contention, but as Meakins remarks (*Nelson's Loose Leaf Living Medicine,* Vol. II, 191) the recurring evidence of a general infection in certain cases after repeated fresh attacks of urethritis would lend support to the view.

There is no direct ratio between the severity of the primary local inflammation and its secondary general manifestation, many cases of very marked general infection following mild or even scarcely noticed genital inflammation.

That generalized blood and lymph stream infections do exist is evidenced by the increasing number of positive blood cultures reported in the literature, and this in spite of the well-known difficulty of growing the gonococcus on culture-media. General infections, in the true sense of the term, which may be caused by the gonococcus, are gonorrheal bacteriemia or septicemia and pyemia.

Septicemia.—Gonorrheal septicemia is an uncommon condition, sometimes following tissue trauma in the presence of localized infection. Ac-

cordingly it follows delivery or abortion, certain statistics showing that 25 per cent of all puerperal sepsis is due to the gonococcus. This estimate seems high, but in any case the organism is probably a frequent offender in this respect.

When there has been undue trauma in cases of abortion, there is also apt to follow a septicemia, usually very grave in character.

Diagnosis.—The diagnosis of gonorrheal septicemia may only be reached with certainty by the recovery of the causative organisms from blood cultures. Failing in this evidence, absolute diagnosis is impossible.

Clinically, however, gonorrheal septicemia presents certain peculiarities which render the arrival at a provisional diagnosis fairly simple.

Following labor or abortion, if evidences of systemic infection develop within twenty-four to thirty-six hours of the delivery, with elevation of temperature and pulse rate and possibly a moderate rigor together with some malaise, suspicion of gonorrheal sepsis is justified. The temperature is not high, 101° to 102° F. being about the upward limit, the pulse is commensurate with the temperature and there is a moderate leukocytosis of from 12,000 to 15,000. The tongue is furred and dry, the appetite poor, the bowels constipated.

Arthritis, developing in one or several joints, is a very common complication, while endocarditis, so usually a sequel of septicemia due to organisms other than the gonococcus, is notably uncommon in generalized neisserian infection.

Treatment.—Gonococcic septicemia is treated as all similar infections caused by the pyogenic bacteria. Supportive treatment in general, frequent blood transfusions, of 200 to 500 c.c from a well typed donor, possibly the intravenous injection of mercurochrome in 1 per cent solution (30 c.c. to the woman of 150 pounds weight), all offer some hope of cure.

Vaccine treatment has been employed but without marked success.

Gonococcic septicemia is a grave condition with a high mortality, and an aftermath of diseased joints and probably a damaged heart muscle to impede the patient's return to health.

ARTHRITIS

This term includes all the metastatic gonorrheal inflammations, involving the synovial membranes of joints, tendon sheaths, bursæ, etc. The complication, said to be present in from 2 to 8 per cent of all cases of

gonorrheal infections is much less common in women than in men, and when noted in females is much more prevalent in young girls and infants than among adults. In the former, it may follow ophthalmia neonatorum, no genital infection being demonstrable at any time. One or many joints may be involved, the rule being that the younger the patient the more tendency there is to polyarthritis. The belief is growing that gonorrheal arthritis is quite common, and arthritis occurring in a young adult who presents a history of an attack of gonorrhea within a year, may reasonably be assumed to be of gonococcal origin.

Any joint may be involved, but the usual order of frequency is (1) knee, (2) ankle, (3) wrist, (4) fingers and great toes, (5) elbow, (6) shoulders, (7) hips, (8) jaw. In women who do housework, the knee, wrist, ankle and small bones of the hand are usually involved.

Traumatism is frequently the exciting cause, which would account for the order of the involvement of joints in working women.

Pathology.—Arthritis is the result of a true metastatic, blood-stream infection, with the usual sequence of events found in acute inflammation of synovial membranes, that is, edema, round-cell infiltration and serofibrinous effusion, with the eventual formation of adhesions. There may be pus formation with more or less destruction of the entire joint, especially if the infection becomes a mixed one, streptococci or staphylococci being especially prone to produce erosion of cartilage and osteomyelitis.

The clinical varieties which are met with are:

1. Arthralgia, a condition of wandering joint pains without definite evidence of inflammation except, possibly, some redness and swelling.
2. Arthritis with true inflammation of one or several joints.
3. Acute synovitis, without much effusion, the condition closely simulating a tuberculous joint.
4. Chronic serous synovitis, usually mono-articular, involving the knee and associated with considerable effusion.
5. Purulent synovitis with joint destruction to a greater or less degree.

Symptomatology and Clinical Picture.—The attack comes on with acute pain, usually skipping from one joint to another and finally localizing in one or more, with extreme tenderness, fixation of the joint, redness, swelling and some effusion into and around the joint. The surrounding tendon sheaths and bursæ may become involved, with serous effusion and the development of the characteristic fusiform shape of the joint.

In severe cases the temperature may reach 103° to 104° F. and the patient be extremely ill. In other instances the attack is subacute from the onset and produces little or no systemic reaction.

After two or three weeks of acute symptoms, the temperature falls, and the pain subsides, the joint becoming more or less limited as to motion and with a strong tendency to ankylosis.

When suppuration occurs, septicemia or pyemia may develop, or the pus may localize as an extra-articular abscess. A certain degree of limitation of motion almost always follows a well-defined attack.

Fig. 49.—Acute Gonorrheal Arthritis with a Fusiform Swelling of Knee. (Author's case, Philadelphia General Hospital.)

Diagnosis.—Should an attack of acute rheumatism occur during or immediately after an attack of gonorrhea, the diagnosis becomes simple. In women, however, there may be no history of the initial attack of gonorrhea, nor may the most painstaking bacteriological investigation disclose the organisms in the genitalia. In such instances, the fusiform shape of the joint, the possibility of demonstrating gonococci in fluid aspirated from the synovial sac and, most important of all, the complement fixation test, determine the nature of the process. This test attains its highest value in the differential diagnosis of joint involvement.

Bezacon, Weil and Rubenstein (*Compt. rend. Soc. de biol.,* Paris, 1925, 93: 235), using the antigen from an emulsion of at least six strains of the gonococcus, achieved the following results:

In fourteen patients with rheumatism of non-gonorrheal nature, the reaction was always negative. In twenty-four cases with gonorrheal rheumatism the reaction was positive in 87.5 per cent. In three men with arthritis the reaction was positive, although the intervals since the gonorrhea had been five, seven and twenty-four years, respectively, and all negative as to demonstration of the gonococcus.

Fig. 50.—Gonorrheal Arthritis and Periostitis.
(Author's case, Philadelphia General Hospital.)

The x-ray should always be utilized, since by this method the type of involvement is made clear and the particular variety of treatment for any type of inflammation may be utilized.

Differential Diagnosis.—Gonorrheal arthritis must be distinguished from acute rheumatic fever, tuberculosis of the joints and septic arthritis.

The initial onset is usually less severe than in rheumatic fever, fewer joints are involved, there is a greater tendency toward relapses and final ankylosis, and the complement fixation test is positive.

Gonococcic arthritis is more acute than the tuberculous form, involves more than one articulation at a time, and seldom shows bone destruction.

One type—the phlegmonous gonorrheal arthritis—however, does destroy and erode bones and, should the patient recover, the after results are indistinguishable from osteo-arthritis.

Compared to septic arthritis, the gonorrheal variety discloses gonococci in the aspirated fluid, whereas the pus in the true disease shows the typical pyogenic bacteria. Here again the complement fixation test is of value.

Prognosis.—The mortality of gonorrheal arthritis is low, the morbidity high, complete anatomical cure of a joint once attacked being very rare. Many patients suffer from repeated infection with marked limitation of motion, due to the characteristic behavior of the gonococci in producing adhesions with contractions.

Excellent functional recovery may be expected, however, if prompt and energetic treatment is offered at the outset, and surprisingly good results may sometimes be secured in cases where at first glance the joints seem to be hopelessly damaged.

Treatment.—Prophylaxis consists in the proper, non-traumatizing management of the original gonorrhea. Since it has been shown that acute arthritis has followed the wide dilatation of the infected cervix or the use of a urethral sound, it follows that gentleness of manipulation must be the rule of treatment. If the gonorrhea is accompanied by a febrile reaction, one may anticipate joint involvement and promptly begin the administration of vaccine as a preventive measure.

With the onset of the attack, the patient is at once put to bed, at absolute rest and the joint immobilized by splints or sandbags. Pain is controlled by opiates and diuresis maintained by the exhibition of potassium citrate in 10 grain doses, at four to six hour intervals.

The ordinary drugs used in rheumatic fever, salicylates, etc., are of absolutely no avail in gonococcal arthritis, indeed, their total failure to afford relief being an important point in the differential diagnosis.

Vaccine therapy should be begun at once, a sensitized polyvalent stock vaccine appearing to produce better results than an autogenous vaccine.

The initial dose of a polyvalent vaccine is one half to one million bacteria, increased gradually every five days, so long as no reaction occurs.

Many authorities now believe that reaction is a sign of overdosage, and Abraham says he has seen both gonococcal pneumonia and endocarditis with fatal results follow overdosage on the mistaken principle that reaction is a necessary corollary to active immunization.

Local treatment is carried on parallel to the vaccine therapy, and

consists first in immobilization of the joint by a light splint or in the case of the hip or shoulder the use of sandbags.

The passive hyperemia of Bier is of immense value in these cases. A flannel bandage cut on the bias is applied to the limb at a safe distance above the involved joint, the pressure being great enough to produce swelling and hyperemia without completely shutting off the circulation so as to result in coldness of the joint below the bandage.

FIG. 51.—CHRONIC GONORRHEAL ARTHRITIS.

Note the atrophy of the right wrist and forearm. (Author's case, Philadelphia General Hospital.)

This treatment is carried out for one half hour at first, then the time is rapidly lengthened until the pressure can be comfortably borne for from ten to twenty hours continuously. Pain is soon relieved and in the course of a week or two the swelling subsides, and passive motion, massage and electricity may be applied to combat the ever present tendency toward ankylosis.

In true fibrinous arthritis, there is not much swelling, but very marked limitation of motion, with a rapid atrophy of the muscle about the affected joint and marked toxemia on the part of the patient.

The treatment by vaccine and passive hyperemia may be supple-

mented by the exhibition of large doses of potassium iodid 30 to 60 grains per day, with early resort to arthrotomy in order to conserve the mobility of the joint.

In chronic serous synovitis or hydrops articuli, there is a rapid, almost painless swelling, with a few vague rheumatic pains. The fluid shows little tendency to resorption and a relaxed and greatly weakened joint results. Treatment consists of prompt aspiration under the most scrupulous asepsis, with the injection of a stimulating germicide, as a 2 per cent solution of phenol or better a 5 per cent tincture of iodin solution.

Firm bandaging and prolonged immobility broken by short periods of passive motion are essential to success. Care must be taken not to inject too large a quantity of solution, 5 grains for a knee or hip being a proper dosage.

If a suppurative arthritis should develop, prompt arthrotomy with free drainage and Carrel tube irrigation with normal saline should be employed. This type of arthritis is not only extremely destructive to the involved joints, but is apt to set up a gonorrheal septicemia, with the usual fatal results.

Considerable differences of opinion exist among authorities as to whether the active focus of gonorrhea should receive local treatment while the arthritis is acute. Some observers hold that this practice tends to aggravate the joint symptoms while others believe that the sooner the focus of infection is eradicated, the greater the hope of arresting the metastatic inflammation. The writer is in accord with the latter group and in his practice vigorous local treatment, as set forth in the preceding pages, is instituted immediately the diagnosis of gonorrheal arthritis is made and is continued regardless of a transitory exacerbation of the joint lesions.

Tenosynovitis is an inflammation of the tendon sheath, occurring more often in men than in women, but being a fairly frequent complication of pregnancy. The long tendons are most frequently involved, that of the extensor communis digitorum at the back of the wrist, the peroneus longus and the tibialis posticus being the common tendons afflicted.

The symptoms are pain and swelling in the tendon sheath with consequent loss of motion, and on aspiration the effusion into the tendons sheath usually contains the gonococcus in pure culture.

Treatment.—Absolute rest by splinting for a few days should inaugurate all treatment. The swollen tendon sheath may be punctured and the tension relieved after which the area is to be repeatedly painted with iodin. Careful and persistent passive motion should be begun after a week of

immobilization as there is a great tendency toward the formation of fibrous adhesions with the resultant crippling in these cases.

Vaccine treatment is a routine measure, as is attention to the causative foci.

ENDOCARDITIS

Ricord in 1847 and Brandes in 1854 both recognized the fact that blood-borne gonococci could cause the development of acute endocarditis. Their observations were fully confirmed in 1895 when Thayer and Blumer cultivated the organisms from a patient suffering from acute endocervicitis.

No characteristic feature has been described by which to differentiate gonococcal from any other acute bacteriologic endocervicitis. The usual vegetations, and masses of exudate infiltration with leukocytes are present and the disease is in all respects comparable with endocarditis of other organs.

Diagnosis.—The diagnosis is dependent upon the isolation of the gonococci from the blood stream which is most difficult, or in the absence of other known factors, a positive complement fixation test for gonococci.

Women in the puerperium and children are said to be more susceptible than other persons.

Symptoms.—Gonorrheal endocarditis in a mild form, is probably often present in association with arthritis, or septicemia and from its lack of definite symptoms escapes detection. The symptoms are those of acute endocarditis in general, the manifestation being mild in some instances, very grave in others. Marked and continued pyrexia of the septic type, chills, sweats and intense prostration, and a rapid pulse, with or without alteration in the valve sounds are the rule. Diarrhea and rose spots may confuse the disease with severe typhoid fever, the similarity being accentuated by the tendency to mental hebetude and semicoma. Negative Widal reaction and positive gonococci complement fixation test will aid in the differential diagnosis.

Arthritis occurs in about two-thirds of the cases and its presence is an added corroborative factor.

Pericarditis and myocarditis are sometimes found, the former showing varying quantities of an exudate which may be serous, hemorrhagic or purulent.

Treatment.—Gonorrheal endocarditis is to be managed as is the same lesion whatever its bacteriologic origin, and treatment should be largely symptomatic. Absolute rest in bed, ice-bags to the pericardium, and the

free but guarded use of polyvalent autogonococcal serum, beginning with a very small trial dose, 0.5 c.c. which is rapidly increased, the serum being given intravenously until 10 c.c. freely diluted in 100 c.c. normal saline can be administered daily.

Vaccines may be used but with the greatest caution since a very marked negative phase is often produced by their use.

The intravenous use of mercurochrome in doses of 30 cm. of a 1 per cent solution to a woman of 150 pounds weight has been advised and has sometimes produced startling results.

In mild cases complete recovery may be hoped for, but in the grave ones the prognosis is bad since even though recovery from the initial attack ensue, there is a great tendency to recurrences any one of which may prove fatal.

CYSTITIS

Secondary inflammation of the bladder is a common sequel of gonorrheal urethritis, especially in women. It is usually due to an extension of an active urethritis, sometimes spontaneous but more commonly as a result of catheterization or urethral instrumentation, although it may rarely follow systemic infection by the gonococci. Wertheim (*Ztschr. f. Geburtsh. u. Gynäk.*, Vol. 35, No. 1, p. 1, quoted by Norris) was the first to demonstrate the gonococci in an acute cystitis, he excising a piece of bladder wall through the cystoscope and finding the organisms in the tissue. Young demonstrated gonococci in urine which he obtained by suprapubic cystoscopy, thus excluding the possibility of a urethral contamination.

It would seem that cystitis should be a common complication of urethritis in women, and that this is not the case is probably due to the inhibiting effect of the urine upon these bacteria unless there be an excessive amount of albumin present.

The infection soon becomes mixed and in certain long-standing cases is found to be associated with tuberculosis.

The predisposing causes are anything which tends to lower the resistance of the bladder mucosa. Exposure to cold and wet, an attack of influenza or bronchitis during the course of a gonorrhea, overdistention of the bladder and rough coitus, may all be responsible. More rarely, presence of a fetal head, calculi and other traumatizing agents may be at fault.

The lesion may be limited to its point of origin which is usually the

trigone and which is the region most resistant to treatment. From the trigone the inflammation may spread to the fundus of the bladder.

The disease may be acute or subacute from the onset and frequently is associated with so little disturbance that it passes unnoticed by the patient and remains as a chronic focus of infection.

More commonly the symptoms are fairly severe, urgency and frequency of micturition, with tenesmus, both vesical and rectal, slight elevation of temperature, headache and restlessness. The urine is usually acid at first, contains mucus, much epithelial débris, and some red blood-corpuscles.

As the condition becomes chronic, the same symptoms persist but in less severe form.

Diagnosis.—The diagnosis of gonorrheal cystitis is based upon the symptom-complex just described, plus the demonstration of a focus of gonorrhea either in the urethra, Bartholin's glands or the cervix. Even with this evidence, diagnosis is not certain unless the gonococcus is demonstrated in the urine obtained from the bladder and then all possibility of urethral contamination must be excluded before a definite diagnosis can be made.

Cystoscopic examination reveals a swollen, inflamed and infected bladder mucosa. The trigone is usually intensely congested and fiery red. There may be one or more shallow ulcers at the margin of the trigone or sometimes in the bladder fundus.

In old, resistant cases there may be areas of granulation tissue, covered with urinary salts and débris.

Treatment.—Gonorrheal cystitis is to be managed along the same plan that applies to cystitis of any origin, with the addition that the infective focus of the disease must receive coincident attention.

In the acute stages, rest in bed, hot fomentations over the bladder region and the exhibition of drugs which render the urine alkaline and allay spasm are indicated. For the former purpose, potassium bicarbonate in 20-grain doses, in combination with potassium citrate, 20 grains, given four or six times daily, procures admirable results. To allay spasm small doses of tincture belladonnæ, 2 to 5 minims, are added to the potassium salts. Abundant drinking of fluid liquids, is encouraged notably Vichy water and the old-fashioned though highly valuable flaxseed tea.

Hot sitz-baths are grateful to the patient and after each urination the external genitalia should be irrigated by a warm mildly germicidal solution, as weak lysol.

From a few days to a week of such treatment usually brings about a marked amelioration of the symptoms, after which the urine may be allowed to resume its normal acid reaction, which may be hastened by the administration of acid sodium phosphate in doses of from 20 to 30 grains before meals, with or without sodium benzoate in 10 grain doses.

Recently Muschat (*J. Urol.*, 1926, 15:375) has shown that ammonium chlorid in doses of from 7 to 15 grains three times daily causes a decided increase in the normal urinary acidity and that it is of great value in the same dosage in changing the reaction in cases of alkaline cystitis.

As soon as acidity of the urine has been restored, hexamethylenamin, 5 grains five times daily, should be given. This drug liberates formalin in the urine in more than 50 per cent of the cases in which it is administered but acts only in acid urine, having but slight activity in alkaline urine and none whatever in the presence of free ammonia.

Local treatment may now be commenced, and consists of periodical irrigation of the bladder by means of a funnel, rubber tubing and rubber catheter. Many substances are advocated as intracystic germicides, copper sulphate 1 per cent, acriflavin, 1:4000, silver nitrate, 1:1000, and so on. In the writer's experience the bland silver salts as argyrol in 10 per cent strength or protargol 5 per cent offer the best results. Care must be taken that the external genitalia are clean, and that no discharge is present in the lower urethra, and to insure against this, it is well to very gently swab the urethra as far as Skene's glands, with a small cotton applicator soaked in the silver solution. Sufficient germicide must be used to thoroughly distend the bladder, the solution should be at a temperature of 100° to 102° F., and the irrigation should be performed every third day.

Ulcers of the bladder are best treated by the direct application of silver nitrate solution of 15 to 20 per cent strength, through the cystoscope. In very severe cases, with multiple ulcers and much thickening, continuous drainage by a permanent mushroom catheter offers great relief, and in certain obstinate cases it may be necessary to make a temporary vesicovaginal fistula to insure the bladder mucosa freedom from the irritation of the urine.

PROCTITIS

Because of the anatomic relationship, rectal gonorrhea is more common in women than in men, but even so, the complication is at best a rare one. Certain European observers place the proportion very high, but American authorities cannot corroborate their figures.

The writer is inclined to believe that proctitis is more commonly a primary lesion, the result of sodomy, or infection from the fingers, enema nozzles or the like, than secondary to genital gonorrhea.

This seems to be borne out by the rarity of rectal involvement in the numberless cases of gonorrhea in women, when the discharges from the vagina have assuredly been in repeated contact with the anal regions. As Norris says, the fact that the sphincter is usually tightly contracted, and the structures external to it are covered by squamous epithelium, a type of tissue in which the gonococcus never flourishes, will explain the infrequency of proctitis. Occasionally the disease may be due to the rupture of a gonorrheal pyosalpinx into the rectum.

Gonorrheal proctitis may be very mild or extremely severe. At first a feeling of fullness in the rectum with some heat and itching are noted. Tenesmus rapidly develops and severe pain may supervene with fever and rigors. The entire anal region is extremely tender to touch and the pain is aggravated by exercise.

There is a discharge of yellowish pus from the anus, which later becomes thin and streaked with mucus. Bleeding may be a pronounced symptom.

As the disease becomes more chronic, there develops a more or less intense dermatitis about the pudenda, condylomata are common and luxuriant in growth, and fissures and strictures occur. There is a tendency to ulceration, persistent abscess and sometimes to prolapse of the rectal mucosa.

If the disease is due to long-continued sodomy, the anus becomes depressed and funnel shaped, a very characteristic finding.

Demonstration of the gonococcus in rectal discharges, the funnel-shaped anus and a careful history are the essential factors of diagnosis. The bacteriological examination must be especially painstaking since in the normal flora of the rectum there abide many organisms, such as the *Micrococcus catarrhalis,* which may readily be mistaken for the gonococcus.

Treatment.—During the early stages, rest in bed, hot fomentations to the anal region, pads soaked in hot lead water and laudanum being especially grateful, and a light diet are indicated. At frequent intervals, the entire area should be gently cleansed with soap and water and dried by patting. The bowels may be kept open by mineral oil, milk of magnesia or other gentle cathartics. Hot sitz-baths are frequently of great value. After a few days local treatment may be begun, by first administering a

cleansing enema of 10 per cent solution sodium bicarbonate to remove mucus from the rectal wall, and then instilling from 2 to 4 ounces of a 20 per cent solution of argyrol or 10 per cent protargol.

If this procedure is too painful, a rectal suppository of argyrol with or without powdered opium 1 grain, may be inserted morning and night.

Ulcers must be touched with strong silver nitrate solution, condylomata excised or cauterized as before described, fissures and perirectal abscesses should receive appropriate treatment.

Prognosis is good though gonorrheal proctitis is often extremely chronic and resistant to treatment.

LYMPHADENITIS

Inguinal adenitis is infrequent in women, and rarely reaches the stage of bubo or suppuration. The chains of inguinal glands may be slightly enlarged during an attack, and the enlargement become more marked just preceding menstruation.

Treatment is rarely necessary, though painting with iodin may be suggested, and in these infrequent instances of suppuration, incision and drainage must be performed.

CHAPTER XVIII

UNUSUAL COMPLICATIONS OF GONORRHEA

GONORRHEA OF THE KIDNEY

This lesion, while regarded as rare, is probably not very uncommon, and will explain certain cases of pyemia or very resistant cystitis.

Modes of Infection.—The gonococcus may reach the kidney via the blood stream in cases of gonorrheal septicemia, though this is an uncommon genesis, as shown by Cole (*Osler's Modern Medicine,* 1908, Vol. III, p. 90) who analyzed twenty-nine cases of gonorrheal septicemia with none of them showing any kidney involvement.

More frequently, however, the organisms reach the kidneys by an ascending infection originating in an arthritis or cystitis and spreading either by continuity up the mucous membrane of the ureter or along the periureteral lymphatics. In such cases the kidney infection when discovered is generally a mixed one, streptococci, staphylococci or colon bacilli being found in joint possession of the tissues.

Gonorrheal infection of the kidney is favored by any condition that obstructs the free flow of urine or lowers the resistance of the kidney. Thus ureteral stricture, pressure by tumor or pregnancy, or preëxisting kidney disease will tend to a gonorrheal complication.

The disease begins as a pyelitis, which may become chronic, and be followed by abscess formation in the kidney parenchyma—true pyonephrosis.

Symptoms.—The symptoms are those of a pyelitis, of subacute type, backache, low-grade septic temperature, occasionally hematuria, nocturnal frequency and if the infection is of the ascending variety, pain and tenderness along the ureter. The urine contains albumin, pus, blood-cells and gonococci.

Diagnosis depends upon the demonstration of gonococci in the pus obtained from the kidney pelvis by ureteral catheterization, plus the evidence of history of an attack of gonorrhea and the symptomatology.

Treatment.—This depends upon the degree of kidney involvement and the stage of the disease. Ureteral catheterization and pyelography

will determine whether or not the inflammation is confined to the kidney pelvis or whether abscesses have formed in the parenchyma.

If pyelitis alone is present, the acute attack is best managed by rest in bed, very free liquid diet and the oral administration of hexamethylenamin. After a few days of treatment the more acute symptoms usually subside and the pelvis of the kidney may be flushed with a 1 per cent silver nitrate solution introduced via the ureteral catheter. The solution should be instilled by gravity, care being taken that no undue pressure is exerted upon the pelvis. When extensive destruction of kidney tissue has taken place, with abscess formation, nephrotomy or nephrectomy is indicated.

The *prognosis* is guarded both as to life and recovery, as general septicemia may follow a pyonephrosis.

URETERAL STRICTURE

Gonorrheal cystitis and pyelitis are occasionally followed by a ureteritis with resulting stricture. These strictures which have been so carefully studied are quite frequent in women and a certain proportion of them are probably due to a previous gonorrheal infection.

The symptoms are a dull pain in the iliac fossa on the involved side, occasional lumbar pain and unless the ureter becomes completely occluded with a hydronephrosis resulting, no other symptoms are noted.

The treatment is the dilatation of the stricture with an olive pointed ureteral catheter via the cystoscope.

PULMONARY GONORRHEA

Gonorrheal pleurisy, bronchopneumonia and *pulmonary infarction* may follow gonorrheal septicemia but are very rare.

Neuralgia, neuritis, otitis and parotiditis, myositis and subcutaneous abscess have all been reported as due to the gonococcus or its toxins but are excessively uncommon, as are the somewhat doubtful cases of stomatitis and nasal gonorrhea.

Skin eruptions also occur in conjunction with neisserian infection. They vary from simple erythema to bullous or hemorrhagic dermatitis and hyperkeratosis. The skin lesions are usually followed by confinement in bed, excessive perspiration, irritation from unclean linen and the like.

The treatment is that of similar dermatological lesions of other origins.

Phlebitis and thrombosis have been recorded as developing in the course of an attack of gonorrhea, but as the diagnosis, symptomatology, and treatment are in no sense specific these conditions require no special description.

PERIOSTITIS

Occasionally the bone is attacked in gonococcal joint lesions, the lesions being usually not marked and developing in the epiphyses of the long bones. When the metacarpals or metatarsals are affected there is pronounced crippling, but in other bones there is simply a thickening shown by the x-ray, attended by pain, some limitation of motion and muscular soreness. Constitutional symptoms are rarely present except in the most acute cases, and suppuration is uncommon.

Exostoses sometimes follow such periostitis, the most frequent seat being the os calcis where a spur sometimes forms giving rise to the so-called painful heel. This well-known condition may be unilateral or bilateral and by reason of the pains produced by pressure upon the plantar surface of the os calcis, the patient walks on tiptoe as a result of which pain develops in the calf muscle and considerable crippling may result.

Abraham and other observers believe that this condition is more often due to tenosynovitis of the tendo achillis sheath or the insertion of the tibialis posticus in the sole of the foot may have become inflamed and softened thus causing the plantar fascia to relax and inducing flat-foot. Occasionally there is an inflamed bursa under the os calcis, and these authorities believe that the least common condition is the exostosis spreading from the origin of the flexor brevis digitorum.

Treatment.—This consists in the excision of exostoses when found, removal of an inflamed bursa, local application of tincture of iodin and rest and immobilization of the affected area.

Attention to the causative gonorrheal focus is necessary and the free exhibition of potassium iodid often results in complete relief.

Vaccine treatment should also be employed, polyvalent stock vaccines being the most efficient.

The injection of a foreign protein, especially milk, is often of great value, the technic being that before described.

Gonococcal perineuritis, perichondritis and myalgia also occur and are probably due to the activities of the gonotoxin and are to be treated by vaccines, attention to the gonorrheal focus, potassium iodid and diathermy.

CHAPTER XIX

VACCINE THERAPY AND PROTEIN THERAPY

VACCINE THERAPY

General Considerations.—In recent years vaccine therapy has been extensively employed in the treatment of gonorrhea but the reported results have not been very definite, although it does seem that the duration of the disease is shortened by their use.

The first vaccines were prepared from a single strain of gonococci, but it was soon found that a polyvalent vaccine is absolutely necessary, and that the cultures actually composing the vaccines should not be more than twenty-four hours old. When a polyvalent fresh vaccine is not available, stock preparations may be utilized with considerable hope of success. The dosage is important, since local, focal reactions are to be avoided and a small, gradually increased dose is much preferable to a large initial one. From five to ten millions of bacteria should be administered at five-day intervals until improvement occurs or until the treatment has been shown to be unproductive of results.

Where no reaction is observed, the dose may gradually be increased until two hundred millions are taken without ill effect. Vaccines are much less valuable in the direct manifestations of gonorrhea than in the metastatic forms, and attention is drawn to their use in arthritis, gonorrheal sepsis and the like as described in the treatment of these conditions.

In endocervicitis and salpingitis, mixed vaccine must be used since the infection in these cases is no longer purely gonococcal in character but is complex, the staphylococcus and the streptococcus being also usually present together with the *Bacillus coli communis.*

Detoxicated Vaccine.—As a result of the toxic effect of the ordinary gonococcal vaccine, many cases would tolerate only such small doses of vaccine that the degree of immunity produced was very problematical, and as a result the beneficial effects were small. Thomson has separated, recently, the non-toxic from the toxic element of the gonococcus without reducing the immunizing property of the vaccine. In consequence, much

larger doses of the immunizing portion of the vaccine may be employed, and much better results may now be expected from the proper use of vaccines in systemic gonococcus infection.

The doses which may be employed of the detoxicated vaccine are many times greater than those vaccines which still contain the toxic properties of the gonococci. The initial dose may be as great as twenty-five hundred millions, which may gradually be increased every fourth day until twenty thousand millions or more are given at one injection. The more acute the local manifestations the smaller the dosage and the more cautious its increase, while as the disease progresses and the violently acute symptoms subside, stronger and stronger dosage may be employed. The same principles which are applicable in other forms of vaccine therapy are likewise applicable in this disease. It is not sufficient or right that the physician should use vaccine therapy in a careless manner. The local and focal reactions should be carefully watched, and the patient kept under constant observation.

As yet there is no evidence to show that systemic gonococcal infections require autogenous vaccines. Equally good results are obtained where polyvalent heterogeneous vaccines are employed. It may, therefore, be stated that systemic gonococcal infections, particularly in the subacute and chronic stage, present a most suitable opportunity for the employment of vaccine therapy (J. C. Meakins in *Nelson's Loose-Leaf Living Medicine,* Vol. II, p. 208).

The Gonophage.—A recent and most interesting development in the biology and therapeusis of gonorrhea is that of the gonophage, which is a part of the Twort-d'Herelle or bacteriophage phenomenon and refers to the lysis of bacteria by an invisible and as yet unknown agent that is propagated only in the presence of living bacteria.

Pelouze and Schofield (*J. Urol.,* 1926, 17 : 407) have studied the subject with the most interesting and suggestive conclusions. It was found by Twort, while working with agar plate made of lymph vaccine from the calf, that colonies of micrococci developed on some of the plates, portions of which became glassy and transparent. Microscopic examination of these areas revealed only granular débris and attempts at culture gave no growth. When portions of the material were added to fresh cultures, these in turn became degenerated and this "disease" could be transmitted from culture to culture indefinitely. Whether this action is caused by a viable enzyme, a filtrable virus, or an ultramicroscopic organism pathogenic for

bacteria is unknown, but the phenomenon does exist and the phage has been proven to be specific for various bacteria.

The substance is produced by allowing gonococcus culture upon hydrocele fluid agar slants to undergo complete autolysis, after which the fluid portion of the culture-medium was expressed and found to contain the lytic substance.

This lytic principle is never produced during the period of gonococcal viability and is therefore a product of gonococcal death, not life.

Clinically it has been shown by the same investigators that in males, limitation of the gonorrhea to the anterior urethra could be maintained by the use of the gonophage after the hypodermic injection of 1 c.c. of the substance, whereas it apparently developed no immunity against remote complications and metastatic manifestation.

This subject is still in the experimental stage but offers fascinating opportunities for study and development.

PROTEIN THERAPY

Within the past few years it has become known that many infectious diseases can be cured by the introduction into the body of non-specific protein substances which seem to act by activating the protoplasm of the body-cells, particularly those which have been weakened by infection.

These cells become restored and they become repossessed of their powers to throw off infection.

Various proteins have been used and recommended for this purpose, blood-serum, egg-albumin, all sorts of vaccines. Typhoid vaccine has been used in the treatment of gonorrheal arthritis, acting as a non-specific protein. If given in sufficient dosage, a marked improvement in the joint complication may be effected. But the reaction is severe and the use of typhoid vaccine is not advised. The most generally useful and easily attained agent for this purpose is cow's milk, which was introduced into the medical practice by Robert Schmidt of Prague in 1916. Since this time various preparations of purified casein have also been used of which the trade preparations "aolan" and "caseosan" are familiar representatives.

The technic of the milk treatment is extremely simple. Gellhorn of St. Louis, who was among the first in America to advocate this form of therapy, describes the following method:

Ordinary whole milk is sterilized, either by boiling or by pasteurization at 80° C. for one hour on six successive days. The boiling method of

sterilization is handier for the practitioner who has no access to a reliable laboratory. A previously boiled test-tube is filled with 10 c.c. of milk and then boiled for ten minutes in a water-bath in such a way that the test-tube does not touch the bottom of the vessel. It is then poured into a sterile medicine glass and drawn up into a sterile syringe. By this time it is cool enough to be used. Five c.c. of this milk are injected into the gluteal musculature, or into other muscles—arm, back, etc.—and the injections are repeated at intervals of from three to five days. The stronger the reaction, the longer the interval within this limit. The amount injected is gradually increased to 10 c.c., which is usually reached by the third injection. The average number of injections in my cases was eight; one patient received as many as twelve; a few others had only four injections. If a thin and sharp needle is used, the injections are not painful, although the bulk of the fluid injected may cause a momentary discomfort. There are no sensitive infiltrations to be expected, as after mercury injections.

A culture made of milk thus prepared remained sterile; one of my friends, however, tells me that he regularly obtained a luxurious growth of microbes. Yet in none of my injections was there any vestige of infection nor to my knowledge has a single case of abscess formation been reported in the many thousands of cases published in the literature.

The general reaction occurred, as a rule, from six to eight hours after the treatment. In about half the cases there was a chill followed by a rise in temperature. Only twice did the fever reach 104° F. (40° C.) or over; in the majority of the cases the temperature was between 100° and 102° F. and in some it differed very little, if at all, from normal. A few patients also had nausea, headache or a feeling of drowsiness; in one or two cases there was a somewhat profuse perspiration. These signs of a general reaction appeared only in the beginning of the treatment. After the second or third injection there was, as a rule, no further disturbance of any kind. It is stated by several writers that the initial intensity of this general reaction seems to have a bearing upon the ultimate outcome. This does not quite correspond with my experience; in one case, for instance, where the final result has been particularly gratifying, it was absent altogether. Even where there has been a general reaction, this hardly lasts longer than a day. After that, the patients feel markedly improved; they look better and their appetites improve. Blood examinations have shown me that the white count reaches a moderate degree of hyperleukocytosis on the day following the injection, decreases on the second, and returns to normal on the third day. An anaphylactic shock has never occurred in my

cases nor need it be anticipated. Among the many thousands of injections reported but very few cases of shock have occurred. Peterson remarks very aptly that in these few cases part of the injections may accidentally have reached a vein. Great care, therefore, should always be exercised that the injections are intramuscular. I make it a point to test before injection whether the needle has punctured a vessel.

The results of this treatment while sometimes unsatisfactory are more frequently extremely gratifying.

While the immediate reaction may be severe it is never alarming, and usually subsides by a third or fourth injection.

CHAPTER XX

THE INFECTIOUS GRANULOMATA

No discussion of venereal affections of the vulva is complete unless the infectious granulomata are included. These lesions are granuloma inguinale and lymphogranulomatosis inguinalis, the former being the more frequent.

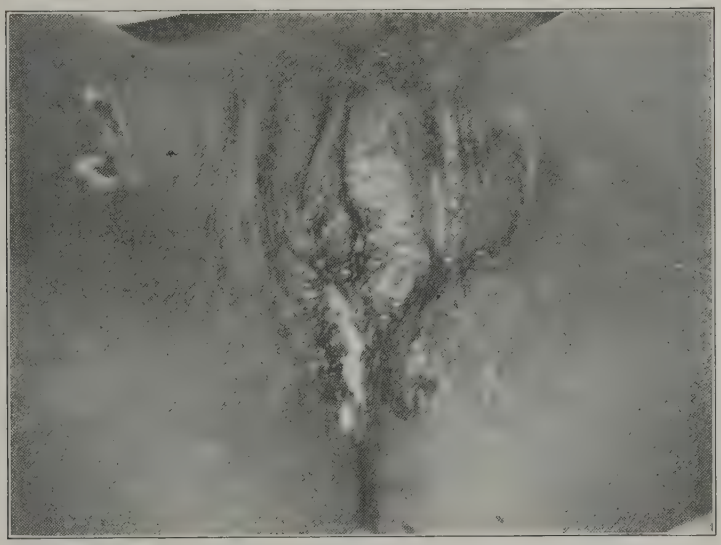

FIG. 52.—CONDYLOMATA WITH GRANULOMA INGUINALE.

Note scars of previous granulomata which have healed. (Author's case, Philadelphia General Hospital.)

GRANULOMA INGUINALE

Incidence.—This disease, also known as ulcerating granuloma of the pudenda, has been endemic in the southern United States and to a lesser extent in the northern states for many years, having originally been transported from the tropics, where it is common. Until quite recently the disease was not recognized, the cases found in various wards of hospitals

and diagnosed being treated according to the predilection of the particular specialist to whose services they were assigned. Thus, in the Philadelphia General Hospital there were always several cases. In the department of tuberculosis, these were regarded as lupus; in the gynecological ward they were thought to be instances of vulvar epithelioma, and in the venereal service they were regarded as evidences of syphilis. This failure of recog-

FIG. 53.—GRANULOMA INGUINALE.

Note the edema and hypertrophy of the labia majora. (Photographed September 22, 1922.)

nition of the true nature of the condition went on until 1920, when there occurred a case in Bellevue Hospital in which Douglas Symmers became interested. While studying this case Symmers was showing an Argentine medical visitor through the wards, who, seeing the patient, remarked that the lesion was a well developed one of granuloma inguinale. The case was later reported by Symmers and Frost and became the first recorded incidence of the condition in the United States. In 1922, Randall, Small and Belk (*Surg., Gynec. & Obst.*, 1922, 23: 717) reported a considerable series,

with detailed pathologic studies. The disease is most commonly observed in Negroes, although a small incidence among whites is found. It affects young women and those in the middle decades of life, being rare in the aged. It is apparently transmitted by sexual relationship and is only mildly infectious. The most complete study of the condition was made by Aragao and Vianna of Rio de Janeiro (*Mem. do Inst. Oswaldo Cruz,* Rio

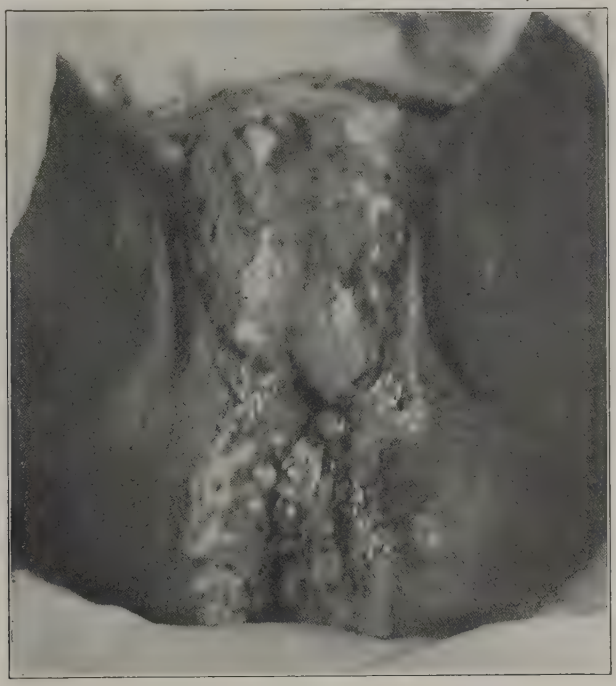

FIG. 54.—GRANULOMA INGUINALE.

A resistant case showing rather poor result after treatment, and with marked connective-tissue hypertrophy. (Photographed May 23, 1923.)

de Janeiro, 1912, 4: 211), where the disease has been present constantly and recognized for a number of years.

Clinical Signs.—The lesion usually begins as a small non-inflammatory papule on the vulva, which papule later ruptures and exudes a purulent fluid, after which the process spreads by a slow proliferation. John A. McGlinn, in his study of granuloma (*Tr. Am. Gynec. Soc.,* 1926, p. 227), states that in the early stages the condition, while it does not closely resemble a phagedenic ulcer, is often mistaken for one, and the usual escharotic

treatment is instituted. The typical lesion is that of exuberant granulomatous tissue which is soft in consistence and red in color. There is usually marked destruction with purulent exudate in the center of the area, while the edges are exuberant and overlap the healthy skin. The entire surface is moist and covered with a scanty mucous exudate, which while not offensive, has a peculiar odor. Upon removal of the exudate, a clean, red granulating surface is disclosed, with masses of indurated

FIG. 55.—GRANULOMA INGUINALE.

Two severe lesions, both cured under intensive treatment. (Photographed May 25, 1923.)

papules about the periphery, interspersed with patches of cicatricial tissue.

Although the name granuloma inguinale would imply that the inguinal region is the seat of the lesion, such is not the case in women, the labia majora being the tissue most frequently attacked, although in advanced cases the entire pudendum and the groins are involved. Sometimes extension into the vaginal canal occurs and the rectovaginal septum may be destroyed. The whole picture is one of an indolent, spreading, low-grade

inflammatory process, with eventual obstruction of the lymphatic circulation, marked edema, and extensive tissue destruction.

Pathology.—As has been stated, granuloma inguinale is essentially a low-grade inflammatory process, affecting the skin and later the inguinal glands. On section, the lesion is seen to consist of a superficial circular area lying on a base of dense, hyaline connective tissues.

The cellular area is composed of young connective tissue, many leukocytes, both endothelial and polymorphonuclear neutrophils. According to

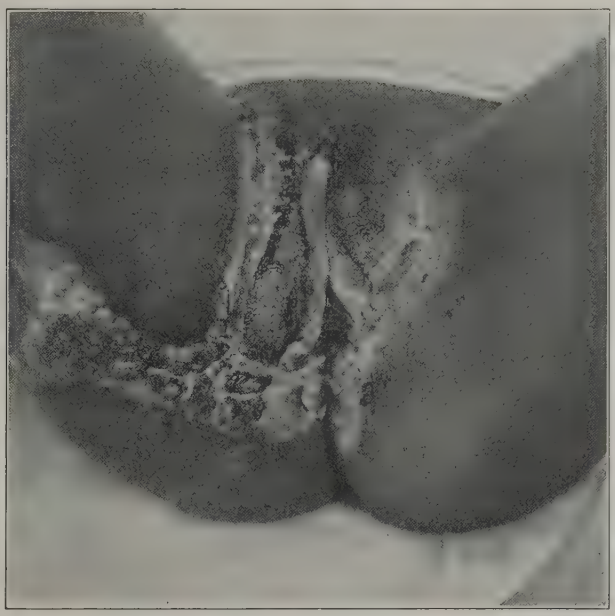

FIG. 56.—GRANULOMA INGUINALE.
An extensive lesion involving the buttock. (Photographed March 19, 1924.)

Randall, *et al.*, at the margin of the granulation, the squamous epithelium of the skin is seen partially destroyed and replaced. Farther out, this merges into normal skin, under which, however, the subcutaneous tissues are infiltrated for a little distance by round cells. This would indicate that the lesions extend somewhat farther than would appear upon superficial inspection of the granulating area.

Sometimes there are noted fingerlike projections of proliferated

squamous epithelium diffusing into the deeper tissues, not dissimilar to a squamous-cell carcinoma.

Bacteriology.—Wire loop smears, stained by the Wright or Giemsa method, reveal a characteristic encapsuled bacillus, first described by Donovan (*Indian M. Gaz.*, 1905, 40:414). These organisms are small rounded, pink bodies, with a blue coccoid body in the center (Wright stain).

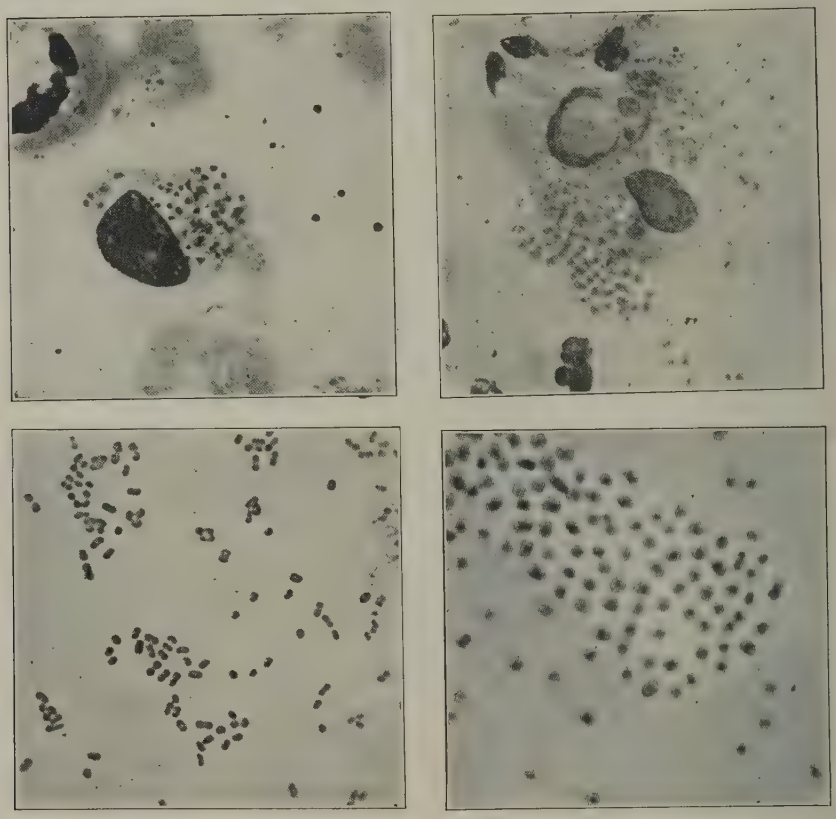

Fig. 57.—Granuloma Inguinale. The Leishmann-Donovan Bodies.

In stained preparations from the lesions, some areas will show organisms with the capsules stained a pale blue and with obscurely differentiated central bodies; other areas will show well-defined, dark blue, metachromatic granules, surrounded by a pink capsule; and still other areas, where the capsules have been entirely destained and in which the organisms

appear as short, thick bacilli with blunt, rounded ends occupied by the dark blue metachromatic granules, presenting a true bipolar stained appearance with the intervening body shaft stained a pale blue. Always a few organisms, usually shorter than those just described, are seen to stain solidly a deep blue.

The organisms are found within the cytoplasm of large mononuclear cells. In such, they either have well-defined capsules, or appear in nests

FIG. 58.—MICROSCOPIC BIOPSY OBTAINED FROM GRANULOMA INGUINALE LESION.

Showing, *a*, swollen large mononuclear phagocyte containing Donovan bodies; *b* and *b'*, endothelial cells of capillary wall; *c*, one undergoing mitosis; *d*, swollen endothelial cell of capillary wall compressing a red blood-cell in the lumen. (Hematoxylin and eosin stain.) (Drawing from collection of J. A. McIntosh.)

in which the bipolar staining may at times be observed. The polymorphonuclear leukocytes do not contain encapsuled forms. Encapsuled organisms may appear free, or in relation to cellular detritus, chiefly in groups and in the neighborhood of large naked nuclei of disintegrating mononuclear cells.

Smears from the lesions are remarkably sparse in other bacteria as compared with smear preparations from the other types of ulcerative

lesions about the genitalia. Staphylococci, streptococci, diphtheroid bacilli, and bacilli of the morphology and staining characters of the colon group, may be observed widely scattered, or grouped within the polymorphonuclear leukocytes.

Animal inoculation has so far proved unsatisfactory, no definite results having been obtained. The disease may be cured by persistent treatment, but always tends to recur, particularly when pregnancy supervenes. In the Philadelphia General Hospital there have occurred six pregnancies in four patients, one woman having three times conceived and been delivered by cesarean section, despite the fact that she had an advanced stage of granuloma with a large rectovaginal sinus and a profuse discharge of feces into the vagina and over the vulva.

FIG. 59.—DONOVAN BODIES IN A LARGE MONONUCLEAR PHAGOCYTE IN SMEAR FROM LESION OF GRANULOMA INGUINALE.

(Drawing from collection of J. A. McIntosh.)

Diagnosis.—The clinical picture of granuloma inguinale is so definite and peculiar that diagnosis can usually be correctly reached by inspection alone. The common error lies in confusing the lesions with tertiary syphilis, and in as much as patients suffering from granuloma frequently possess positive Wassermann reactions coincidentally, the diagnosis may readily be in doubt. The sharp localization to the pudendal region, the resistance of the inflammation to antiluetic treatment and the detection of Donovan bodies in smears, should render the differentiation simple. Bacteriologic studies should always be made upon such lesions and biopsy specimens must be carefully studied.

Effect of Pregnancy upon Granuloma.—From the very nature of the disorder, it follows that conception among women so afflicted is most exceptional. The huge, proliferating masses, simulating immense condylomata with their areas of cicatrization and of raw granulating surface, the foul odor from secondary filth infection and the profuse discharge, especially in the older cases, together with the chronicity of the disease, render pregnancy an obviously uncommon sequel.

Owing to the location and nature of the lesion, vaginal delivery is

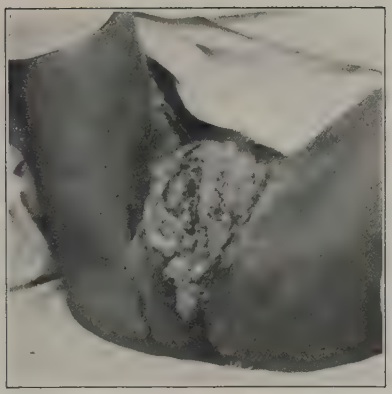

Fig. 60.—Granuloma Inguinale.
(Photographed January 28, 1921.)

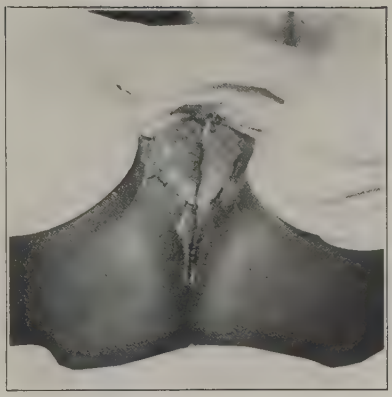

Fig. 61.—Granuloma Inguinale.
Same case as Fig. 60, showing the effects of three months' treatment with tartar emetic. (Photographed April 23, 1921.)

Fig. 62.—Granuloma Inguinale.
This photograph (taken October 24, 1922) shows characteristic recurrence after treatment.

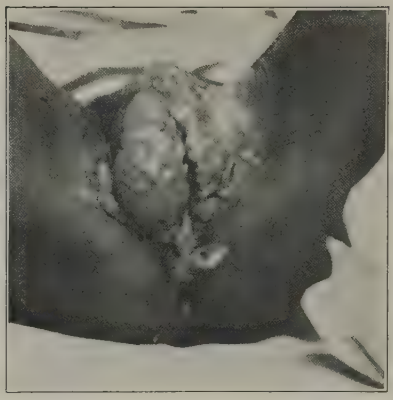

FIG. 63.—GRANULOMA INGUINALE.
(Photographed January 28, 1921.)

FIG. 64.—GRANULOMA INGUINALE.
Same patient as Fig. 63, showing effect of tartar emetic treatment. (Photographed April 23, 1921.)

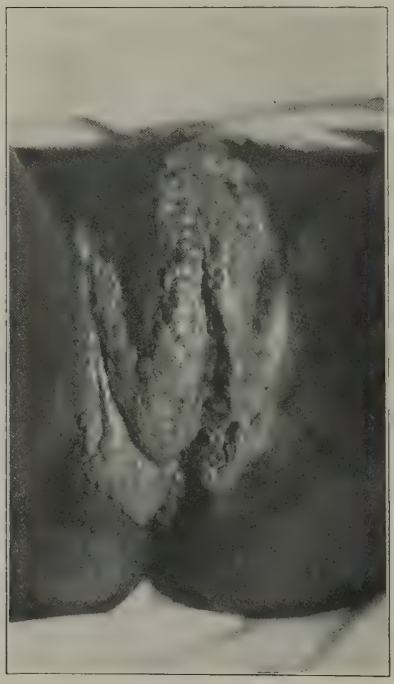

FIG. 65.—GRANULOMA INGUINALE.
Same patient as Figs. 63 and 64, showing effect of tartar emetic treatment. (Photographed June 22, 1922.)

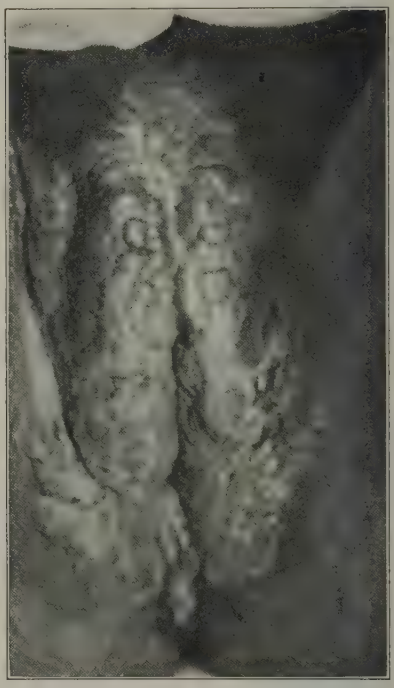

FIG. 66.—GRANULOMA INGUINALE.
Same patient as Figs. 63, 64 and 65, showing effect of tartar emetic treatment. (Photographed May 25, 1923.)

almost always impracticable and cesarean section is the advisable measure to which to resort.

Treatment with tartar emetic, the accepted method, or any other form of therapeutics, gives no relief during pregnancy, the affected areas becoming steadily greater in extent and the activity of the process increasing.

Rapid and severe anemia usually accompanies the superimposition of pregnancy upon granuloma, and the patient is apt to prove a poor operative risk on this account, unless active hematonic treatment is instituted.

For these reasons also, delivery, by section, should be accomplished as soon as the viability of the child is established.

Treatment.—Tartar emetic is a specific in the treatment of granuloma inguinale, while excision of the growth and local treatment are of no benefit whatever, topical applications to promote cleanliness, absorb discharge and destroy the offensive odor being the only local treatment of any value. X-ray has been tried and is but of small benefit, as is radium.

The tartar emetic is used entirely by intravenous injection, and, as has been said, is a distinct specific. The drug has several disadvantages which must be guarded against in its application; namely, the rapid occurrence of severe rheumatoid joint pains, onset of which often causes such acute distress to the patient that treatment must be suspended for several weeks to permit elimination of the antimony. Also, the drug has a tendency to obliterate veins, and to combat this, McGlinn (*Tr. Am. Gynec. Soc.,* 1926, 51: 227) advises beginning the injections in the back of the hand and then to go higher in the arms as the veins become obliterated. In a few instances at the Philadelphia General Hospital, treatment has had to be discontinued before complete healing had occurred, because all available veins had been rendered unfit for further injection.

One-tenth grain of tartar emetic is dissolved in 10 c.c. sterile salt solution and exhibited intravenously once weekly in ambulant cases and every other day in hospital cases. It is difficult to persuade patients to remain in hospital during the several months required for complete cure, and recurrences, common at best, are more frequent owing to the reluctance of these patients to again seek the necessary painful intravenous injections. Lately, Randall and his coworkers have endeavored to secure an antimonial compound of lower toxicity than tartar emetic, and have employed sodium-antimony-thioglycollate and the triamid of thioglycollic acid. While the therapeutic value of these two preparations is still *sub judice,* cases treated with them seem to improve as rapidly as those treated with tartar emetic,

with much less pain and an absence of rheumatic pains and other toxic symptoms.

It must be remembered that cure of granuloma inguinale is exceedingly slow and that recurrences are the rule.

LYMPHOGRANULOMATOSIS INGUINALIS

Incidence.—Lymphogranulomatosis inguinalis is a rare lesion first reported by Nicolas, Durand and Favre, in 1913 (*Bull. et mém. Soc. méd. d. hôp. de Par.,* 1913, 35 : 274), and which they described as a specific genital disease, a clinical entity which had heretofore been observed in tropical countries and which was called climatic bubo or strumous buboes of the groin. More recently quite a number of cases have been reviewed in European literature, and finally, Hillsman, Wilshusen and Zimmermann (*Arch. Dermat. & Syph.,* 1928, 18 : 383) report a case occurring in the United States, with autopsy findings. Owing to the rarity of the disease, cases have not been generally observed and the findings of the above investigators are here quoted.

"Lymphogranulomatosis inguinalis is a contagious venereal disease of unknown etiology, transmitted by sexual intercourse. The initial lesion appears on the glans penis or the prepuce in the male, or on the vulva in the female, as a small, indurated, non-tender, herpetiform lesion, with a slight serous discharge. This lesion is said to be absent in some cases. The incubation period following coitus is from one to six weeks. Following this, there is a period of quiescence in which the painless genital sore is the only manifestation. In several weeks the inguinal glands on one side, more rarely on both sides, become enlarged, indurated and painful. At first they remain discrete, but soon a periadenitis develops, the glands become matted and the overlying skin becomes involved, appearing bluish-red and indurated. Fluctuating areas develop, which on aspiration yield yellow, purulent fluid. The picture is now one of inguinal adenitis which has gone on to suppuration. The iliac glands become enlarged and tender in over half of the cases reported, but suppuration, on the contrary, does not occur. The skin over the mass breaks down, and with the relief of tension, pain and tenderness subside. A chronic, ulcerating, secondarily infected area develops with numerous sinuses in the skin. Healing is extremely slow and sometimes no change is noted for many months.

"Constitutionally there are no symptoms during the period of incubation and the initial lesion, but during the stage of suppuration, before

rupture or the institution of drainage, there may be symptoms suggestive of septicemia with high temperature, delirium and stupor. The blood picture varies; in some cases there is a marked increase in the leukocytes, in others a normal count and in still others leukopenia. There is usually slight anemia.

"Experimental inoculations to reproduce this disease have been unsuccessful, the specific bacteriology is unknown and all forms of treatment have so far proved valueless."

Diagnosis.—It is important to differentiate this rare disease from granuloma inguinale, and Hillsman and his coworkers have set down the following points:

1. Granuloma inguinale is primarily a disease of the skin; lymphogranulomatosis inguinalis first involves the lymph-nodes and only secondarily the skin.

2. Donovan bodies can be demonstrated in the majority of cases of granuloma inguinale; these bodies are not found in lymphogranulomatosis inguinalis.

3. Patients with granuloma inguinale usually respond quite favorably to treatment with tartar emetic; lymphogranulomatosis inguinalis is notoriously refractory to any therapy.

4. The intradermal test of Frei and Hoffman is presumably specific for lymphogranulomatosis inguinalis.

5. The histologic picture of lymphogranulomatosis inguinalis is considered characteristic by most authors.

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